DISSERTATION ON

CORRELATIVE STUDY OF CLINICAL FINDINGS ,AUDIOLOGICAL EVALUATION AND PEROPERATIVE FINDINGS IN PATIENT WITH CONDUCTIVE HEARING LOSS

Dissertation submitted in partial fulfillment of the

regulations for the award of the degree of

M.S.DEGREE BRANCH IV

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MADRAS MEDICAL COLLEGE

CHENNAI – 600003

THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY
CHENNAI

APRIL 2017

BONAFIDE CERTIFICATE

This is to certify that this dissertation is a bonafide record of work done by Dr.S.MADHAN KUMAR on **CORRELATIVE STUDY OF CLINICAL FINDINGS ,AUDIOLOGICAL EVALUATION AND PEROPERATIVE FINDINGS IN PATIENT WITH CONDUCTIVE HEARING LOSS**, during his M.S. ENT course from November2014 to August 2016 at the Madras Medical College and Rajiv Gandhi Government General Hospital, Chennai. He is appearing for his M.S. Branch – IV Degree Examination in April – 2017 and his work has been done with partial fulfillment of the regulations of The TamilNadu Dr. M.G. R Medical University, Chennai. I forward this to The TamilNadu Dr. M.G. R Medical University, Chennai, TamilNadu, India.

GUIDE:
PROF. Dr.N.SURESH KUMAR, M.S.,D.L.O.,
Professor of ENT,
Upgraded Institute of Otorhinolaryngology,
Madras Medical College,
Rajiv Gandhi Govt. General Hospital,
Chennai – 600003

PROF.DR.M.K.RAJASEKAR MS.,DLO.,
DIRECTOR AND PROFESSOR,
UPGRADED INSTITUTE OF OTOLARYNGOLOGY,
Madras Medical College,
Rajiv Gandhi Govt. Gen. Hospital ,
Chennai-600 003

THE DEAN,
Madras Medical College,
Rajiv Gandhi Govt. Gen. Hospital,
Chennai-600 003

CERTIFICATE

This is to certify that this dissertation **CORRELATIVE STUDY OF CLINICAL FINDINGS ,AUDIOLOGICAL EVALUATION AND PEROPERATIVE FINDINGS IN PATIENT WITH CONDUCTIVE HEARING LOSS** been carried out independently and satisfactorily by Dr.S.MADHAN KUMAR in Institute Of Otorhinolaryngology, Madras Medical College and Rajiv Gandhi General Hospital, Chennai under my supervision and guidance. All the case studies, results and observations and their interpretation of the thesis has been done by the candidate and periodically checked by me .He is appearing for his M.S.ENT branch IV degree examination in April 2017 and his work has been done with partial fulfillment of the regulations of The Tamilnadu Dr.M.G.R Medical University, Chennai, Tamilnadu,India

PROF. Dr.N.SURESH KUMAR, M.S.,D.L.O.,
Professor of ENT,
Upgraded Institute of Otorhinolaryngology,
Madras Medical College,
Rajiv Gandhi Govt. General Hospital,
Chennai-600 003

DECLARATION

I DR.S.MADHAN KUMAR, solemnly declare that this dissertation entitled on **CORRELATIVE STUDY OF CLINICAL FINDINGS ,AUDIOLOGICAL EVALUATION AND PEROPERATIVE FINDINGS IN PATIENT WITH CONDUCTIVE HEARING LOSS** is a bonafide work done by me in Upgrade Institute Of Otorhinolaryngology, Madras Medical College and Rajiv Gandhi General Hospital , Chennai during the period of 2014 to 2016 under the guidance of **Prof.Dr.N.SURESH KUMAR M.S.D.L.O.,** Professor, Institute Of Otorhinolaryngology, Madras Medical College and Rajiv Gandhi General Hospital, Chennai – 3 and submitted to The Tamilnadu Dr.M.G.R. Medical University, Guindy, Chennai – 32 in the partial fulfillment of the regulations for the award of the M.S.E.N.T (Branch IV).

Place :Chennai.

Date : **(Dr.S.MADHAN KUMAR)**

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ABBREVATIONS

CHL - CONDUCTIVE HEARING LOSS

TM - TYMPANIC MEMBRANE

PER - PERFORATION

ACT - ACTIVE CHRONIC OTITIS MEDIA

INACT - INACTIVE CHRONIC OTITIS MEDIA

ANT - ANTERIOR

POS - POSTERIOR

CEN - CENTRAL

SUB - SUBTOTAL

PTA - PURE TONE AUDIOMETRY

OCS - OSSICULAR CHAIN SUFFERING

ADOM – ADHESIVE OTITIS MEDIA

CONTENTS

INTRODUCTION

Conductive hearing loss occurs when sound conduction is impaired as a result of pathology in the external or middle ear. The external ear includes the pinna ,which is receptacle of sound and the external auditory canal through which sound passes onto the tympanic membrane. The middle ear is a space that has laterally tympanic membrane and medially cochlea connected by ossicular chain that helps transmit sound optimally. In this study we are going to correlate preoperative clinical findings, audiological evaluation with peroperative findings of patients presents with conductive hearing loss who came to our institution.

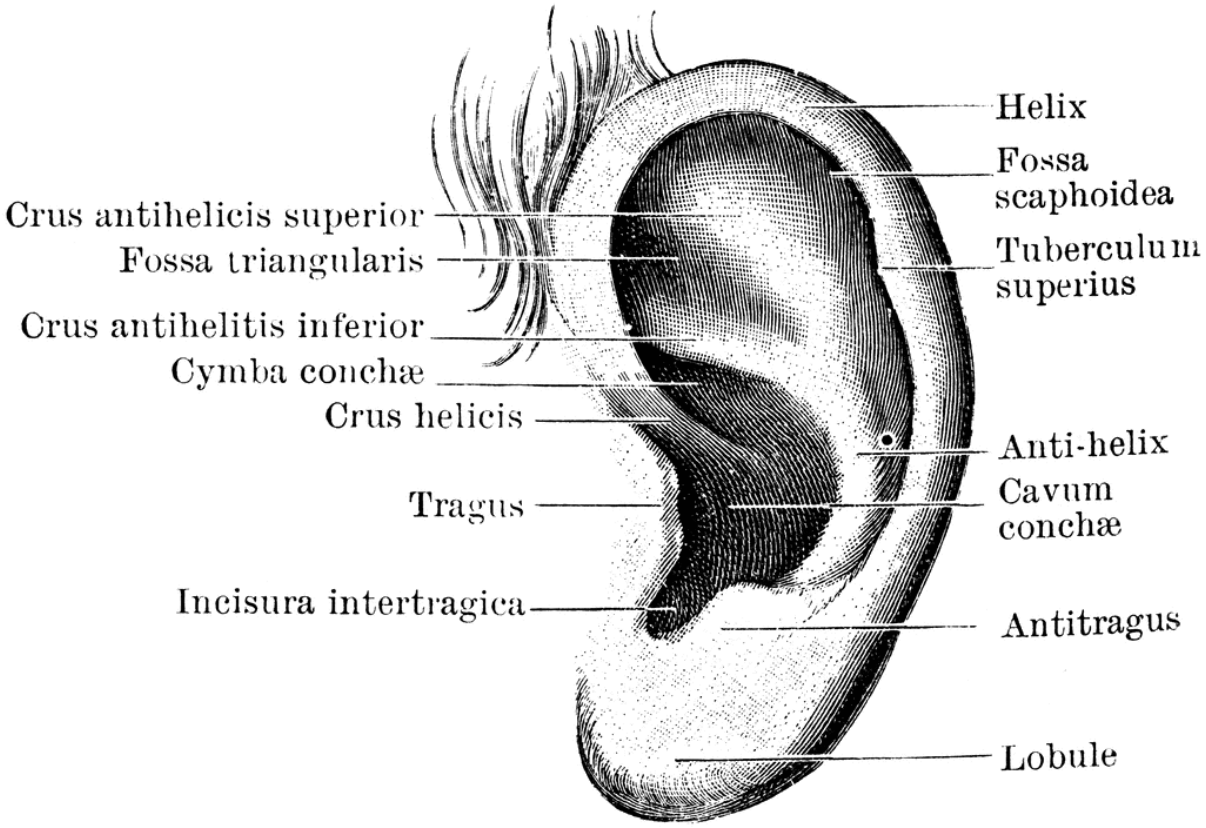
AIMS OF THE STUDY

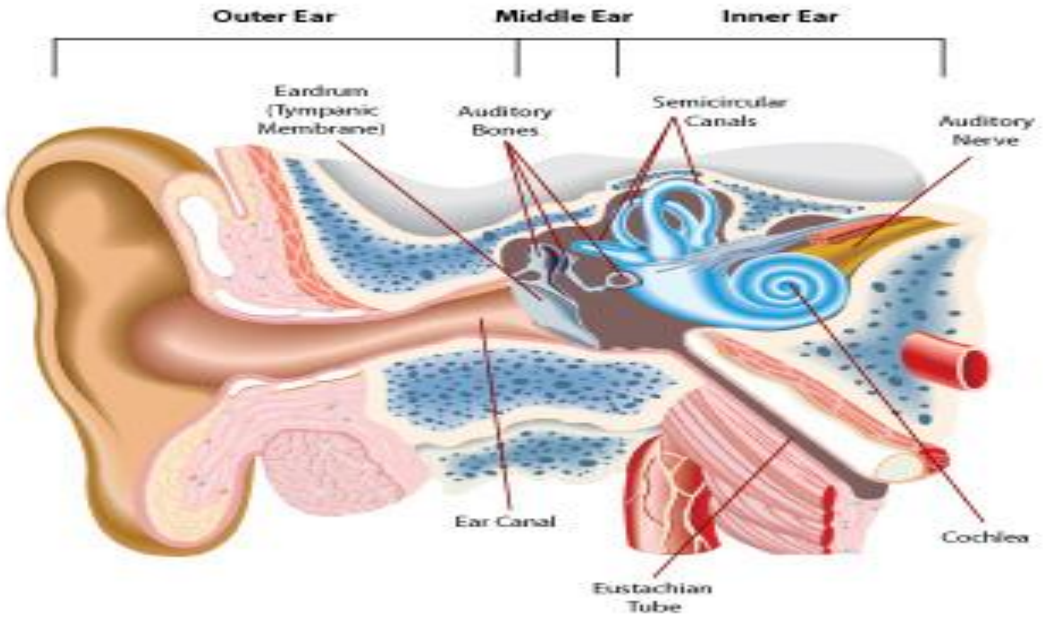
1. To evaluate clinical findings in patients with conductive hearing loss
2. To evaluate audiological findings in same patients
3. To correlate above findings with peroperative findings ,ossicular chain status and disease process in middle ear and mastoid ear cell system

ANATOMY

Pinna

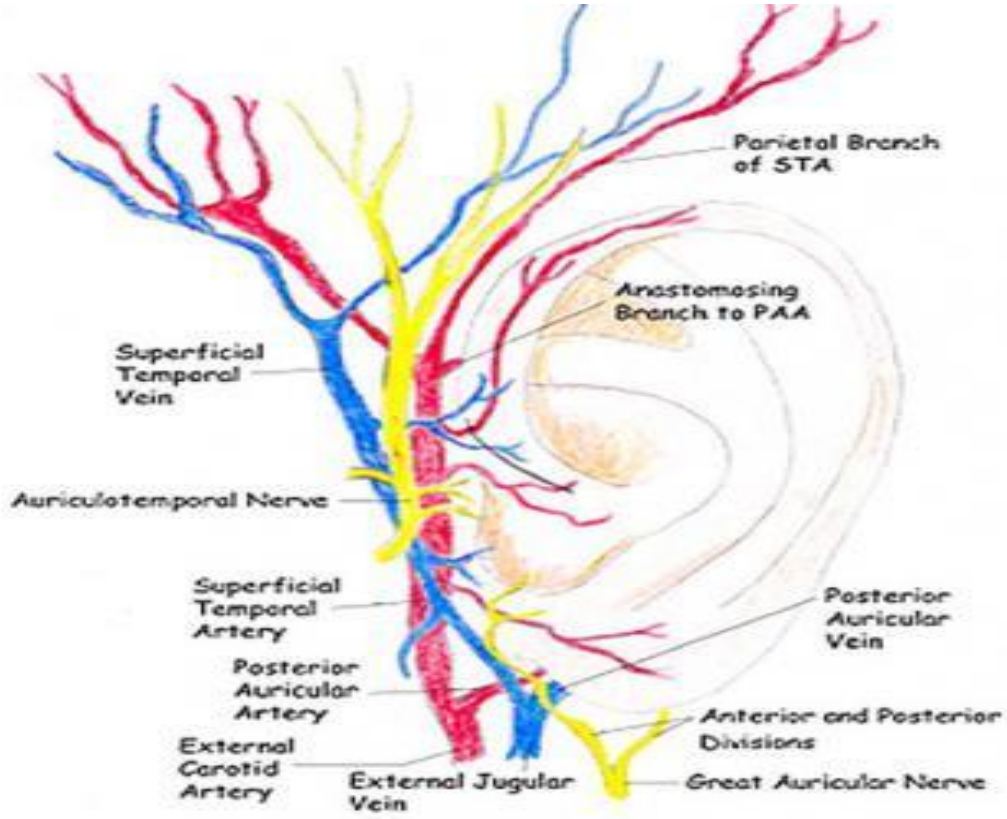
Pinna has a multicomponent embryologic origin. Its shape is determined by the configuration of its elastic cartilage frame . The lateral surface has several concavities, in particular the concha. The skin of both the lateral and medial surfaces have hair and both sebaceous and sudoriferous glands. Though, the attachment of the skin varies – being tightly bound to the perichondrium on the lateral aspect and only loosely attached on the medial. The pinna focus and helps in the localization of sound.


Helix
Fossa scaphoidea
Tuberculum superius
Crus antihelicis superior
Fossa triangularis
Crus antihelitis inferior
Cymba conchæ
Crus helicis
Anti-helix
Cavum conchæ
Tragus
Incisura intertragica
Antitragus
Lobule


Outer Ear
Middle Ear
Inner Ear
Eardrum (Tympanic Membrane)
Auditory Bones
Semicircular Canals
Auditory Nerve
Ear Canal
Cochlea
Eustachian Tube

External Auditory Canal

The cartilage of the pinna continues in the lateral one-third of the EAC. It is deficient superiorly at the incisura terminalis where endaural incision is made during surgeries. The medial two-third of the EAC is bony. The narrowest portion of the EAC, isthmus, lies just medial to the bony-cartilaginous junction. Variably perforations are present in the anterior aspect of the cartilaginous canal known as the fissures of Santorini.

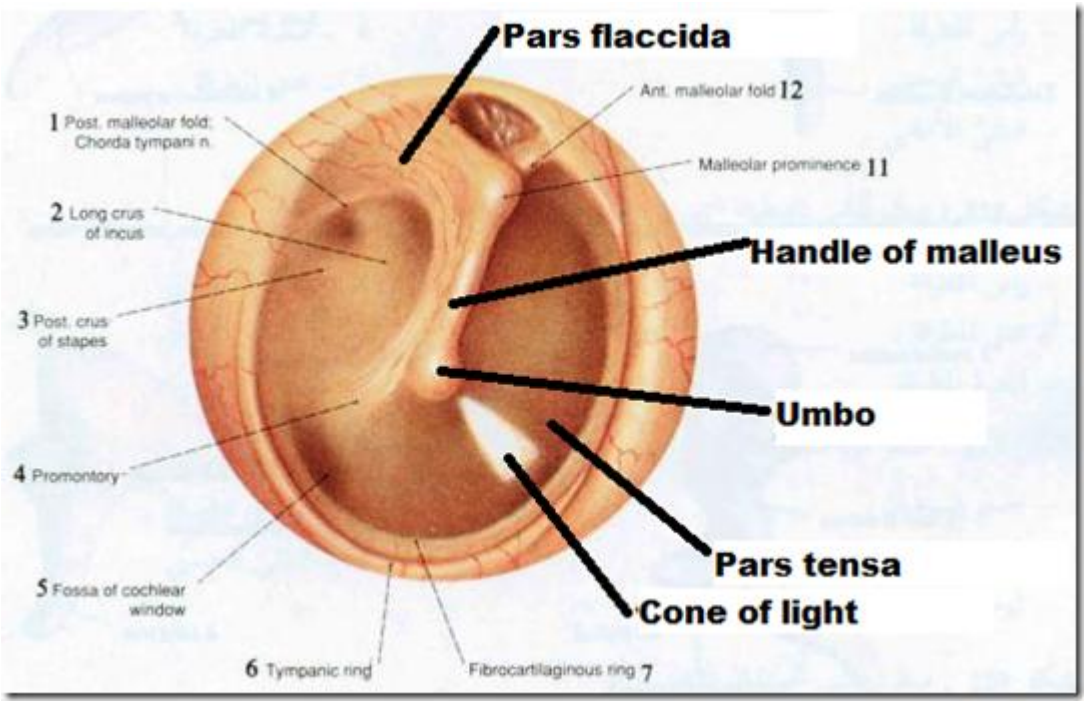


Innervation

The auriculotemporal branch of the trigeminal nerve, greater auricular nerve (a branch ofC3), lesser occipital nerve (of C2 and C3 derivation), auricular branch of the vagus nerve (Arnold's nerve), and twigs from the facial all contribute to the sensory innervation of the pinna and EAC.

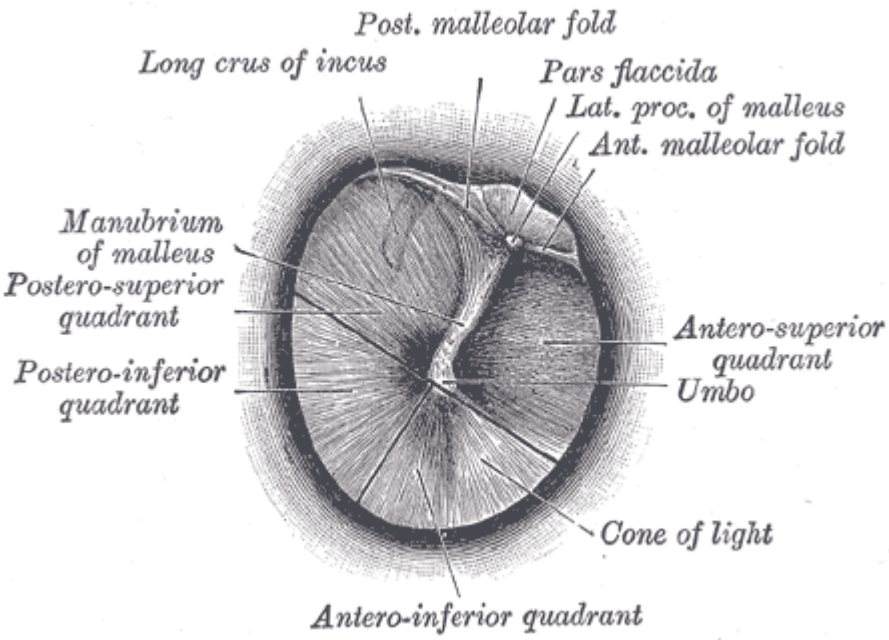
Vascular Supply

Two branches of the external carotid artery, the posterior auricular artery and the superficial temporal artery, are the sources of arterial blood supply to the pinna and EAC.



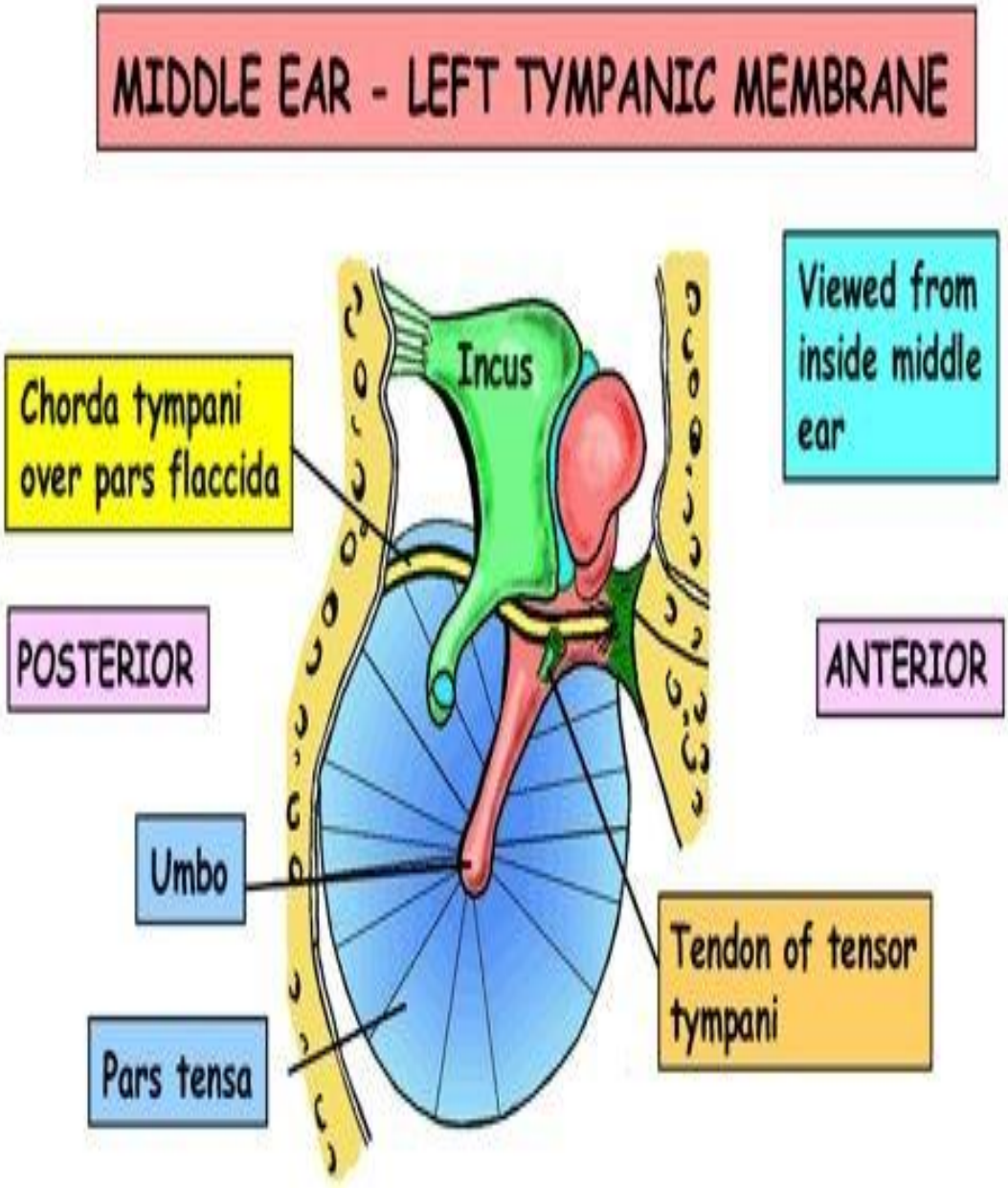
Tympanic Membrane

The adult tympanic membrane is about 9 mm in diameter. It subtends an acute angle with respect to the inferior wall of the EAC, because of which an irregular cone of light is emulated (the apex of which is formed by the umbo). The fibrous annulus of the tympanic membrane is anchored in the tympanic sulcus. It is also firmly attached to the malleus at the lateral process and at the umbo.



Between these two points, only a flimsy mucosal fold, the plica mallearis, connects the tympanic membrane to the malleus. The anterior and posterior tympanic stria runs from the lateral process of the malleus to the anterior and posterior tympanic spines. This separates the tympanic membrane into pars tensa and pars flaccid.

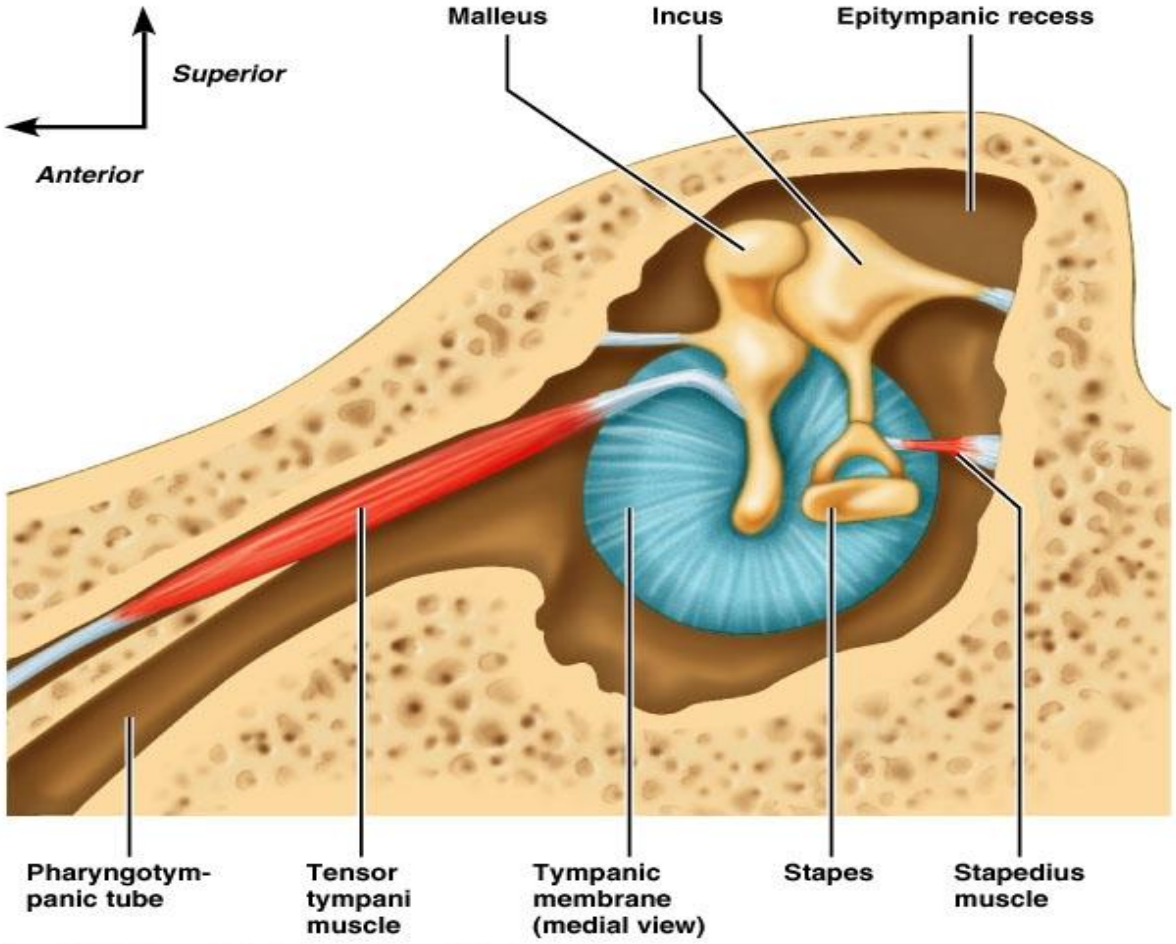
The tympanic membrane is a trilaminar structure. The lateral surface is formed by squamous epithelium. The medial layer is a continuation of the mucosal epithelium of the middle ear. Between this is the fibrous layer.


MIDDLE EAR - LEFT TYMPANIC MEMBRANE
Viewed from inside middle ear
Incus
Chorda tympani over pars flaccida
POSTERIOR
ANTERIOR
Umbo
Tendon of tensor tympani
Pars tensa

Muscles

The tensor tympani muscle originates from the greater wing of the sphenoid, the eustachian tube cartilage, and the walls of its semicircular canal. It consists of both striated and nonstriated fibers which converge into a tendon. It is innervated by the trigeminal nerve.

The stapedius muscle occupies a vertical sulcus adjacent to the facial nerve, in the posterior wall of the tympanic cavity. It is innervated by a branch of the facial nerve. Its action tilts the stapes, stretching the annular ligament and diminishing response to sound stimulation.

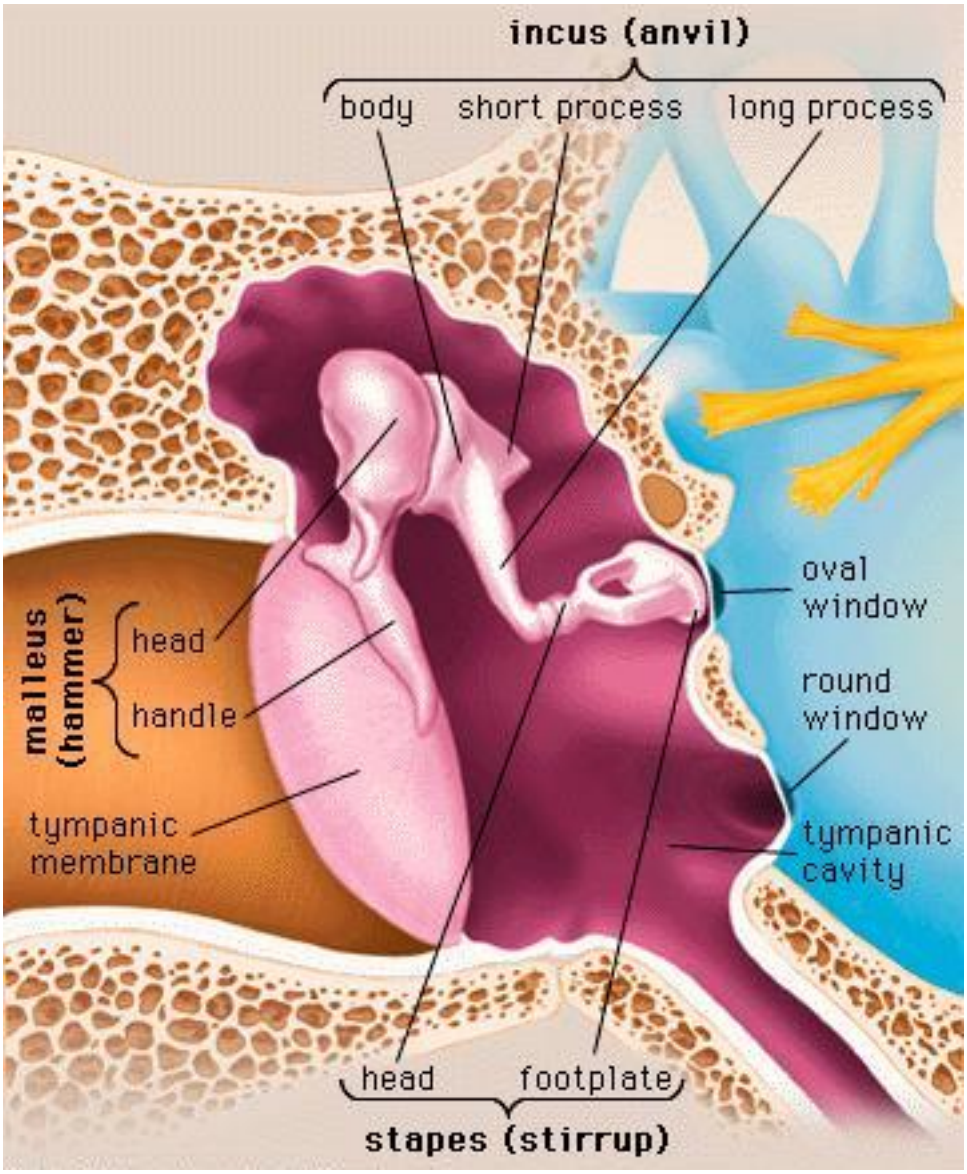


Spaces of the Middle Ear and Mucosal Linings

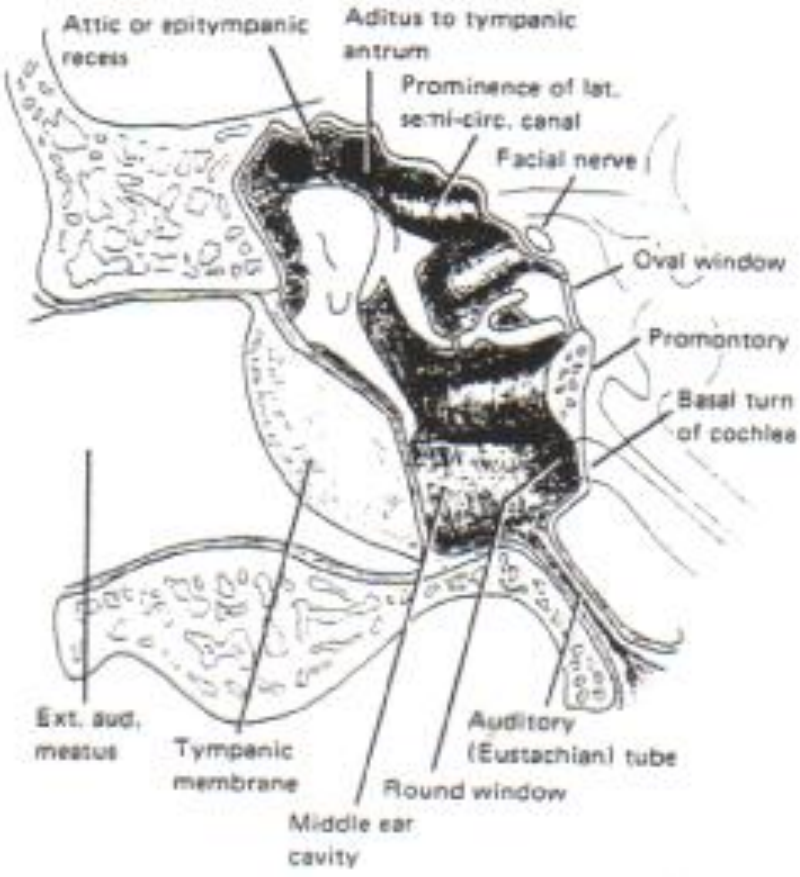
The tympanic cavity can be divided into several anatomically relevant compartments including the mesotympanum, the protympanum, the hypotympanum, and the epitympanum.

It is lined by mucosa consisting of various types of cells. Ciliated cells and secretory (or goblet) cells predominate close to the eustachian

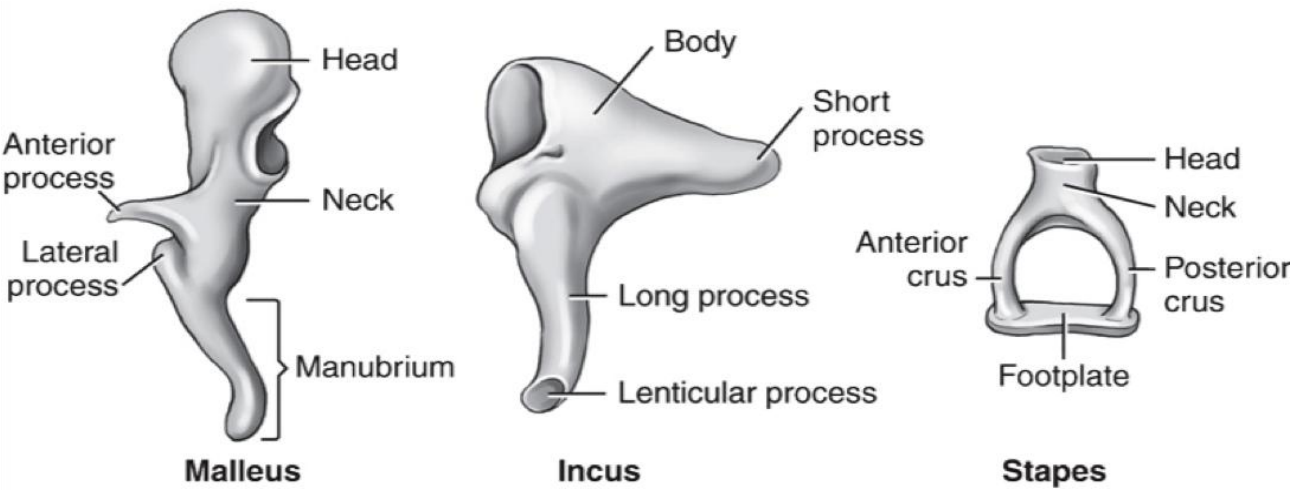
tube and anterior middle ear cavity and transition toward a flat, less ciliated epithelium posteriorly.



Mesotympanum is bound by tympanic membrane laterally and promontory medially. The mesotympanum contains the manubrium of the malleus, long process of the incus, stapes and oval window, stapedius tendon, round window niche and membrane, and cochlear promontory.



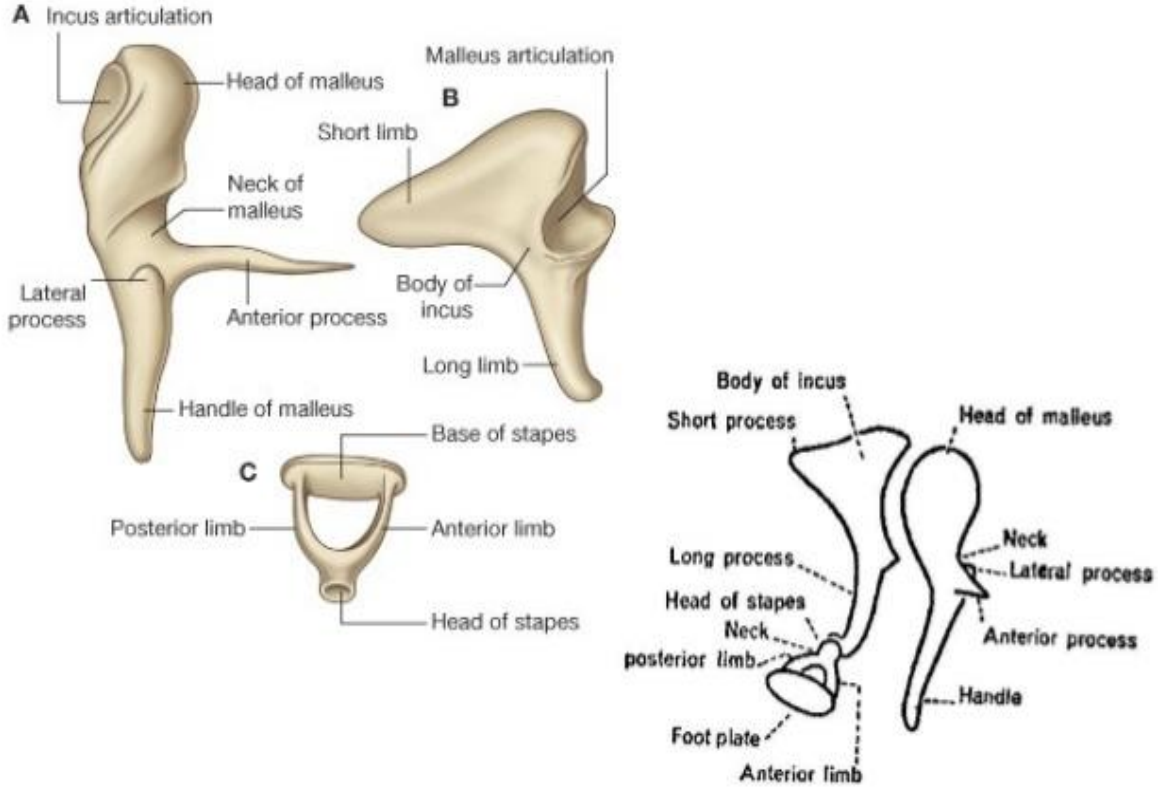
Superior to the mesotympanum is the epitympanum above which is the floor of the middle cranial fossa or the tegmen tympani. This space includes the head and neck of the malleus, body and short process of the incus, the tympanic segment of the facial nerve, and the cochleariform process and tensor tympani tendon. The cog runs vertically starting at the cochleariform process. It is a bony crest that divides the epitympanum into a posterior and an anterior region. The anterior Portion, the supratubal recess, is a difficult region for Cholesteatoma.



The space anterior to the mesotympanum is the protympanum. It includes the bony eustachian tube orifice, the carotid artery, and the semicanal of the tensor tympani muscle.

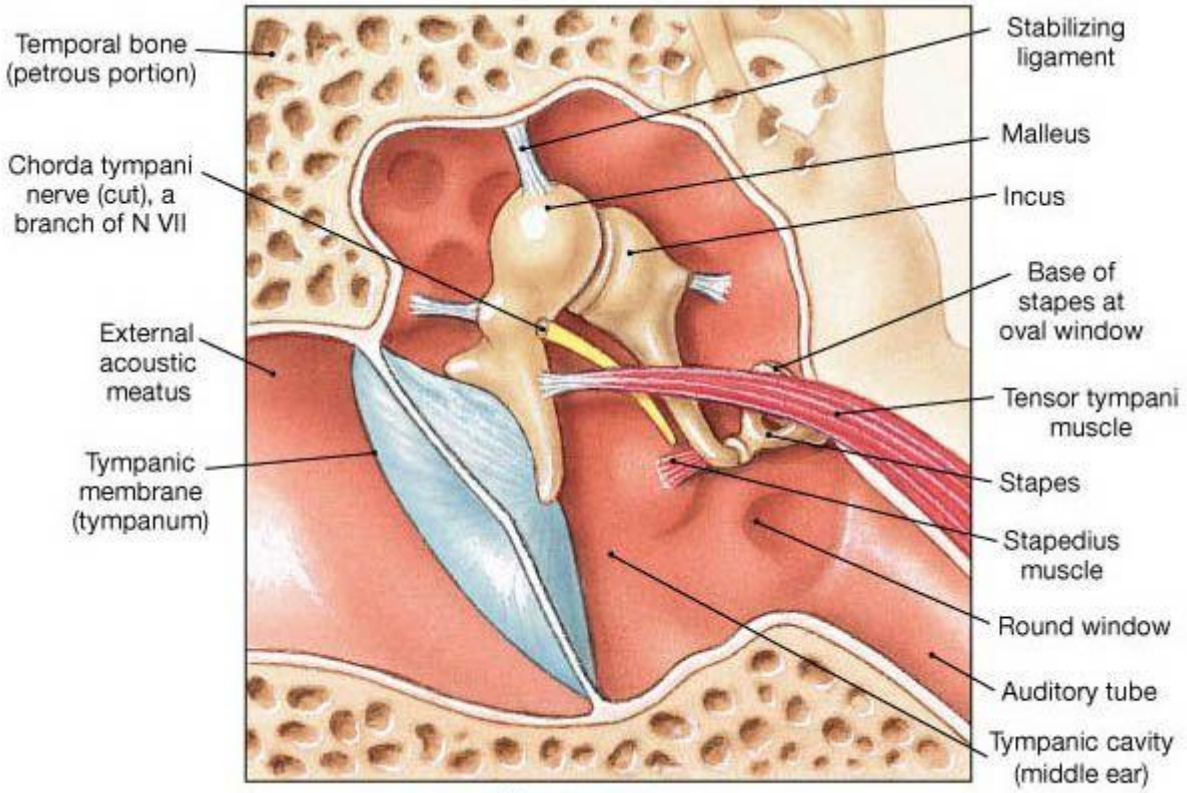
Posteriorly, the epitympanum communicates with the mastoid via the antrum. The hypotympanum lies inferior to the mesotympanum. It

contains the bony canals for the jugular bulb posteriorly and the carotid artery anteriorly as well as the tympanic canaliculus that transmits Jacobson's nerve for the jugular foramen.



The region, posterior to the mesotympanum, is bounded posteriorly by the mastoid segment of the facial nerve, the ampullae of the posterior semicircular canal, and the chorda tympani nerve. Two notable pneumatized spaces in this region include the sinus tympani and facial recess. The sinus tympani is a difficult location for managing cholesteatomas. It is bordered by the ponticulus superiorly, the subiculum inferiorly, the facial nerve laterally, and the posterior semicircular canal

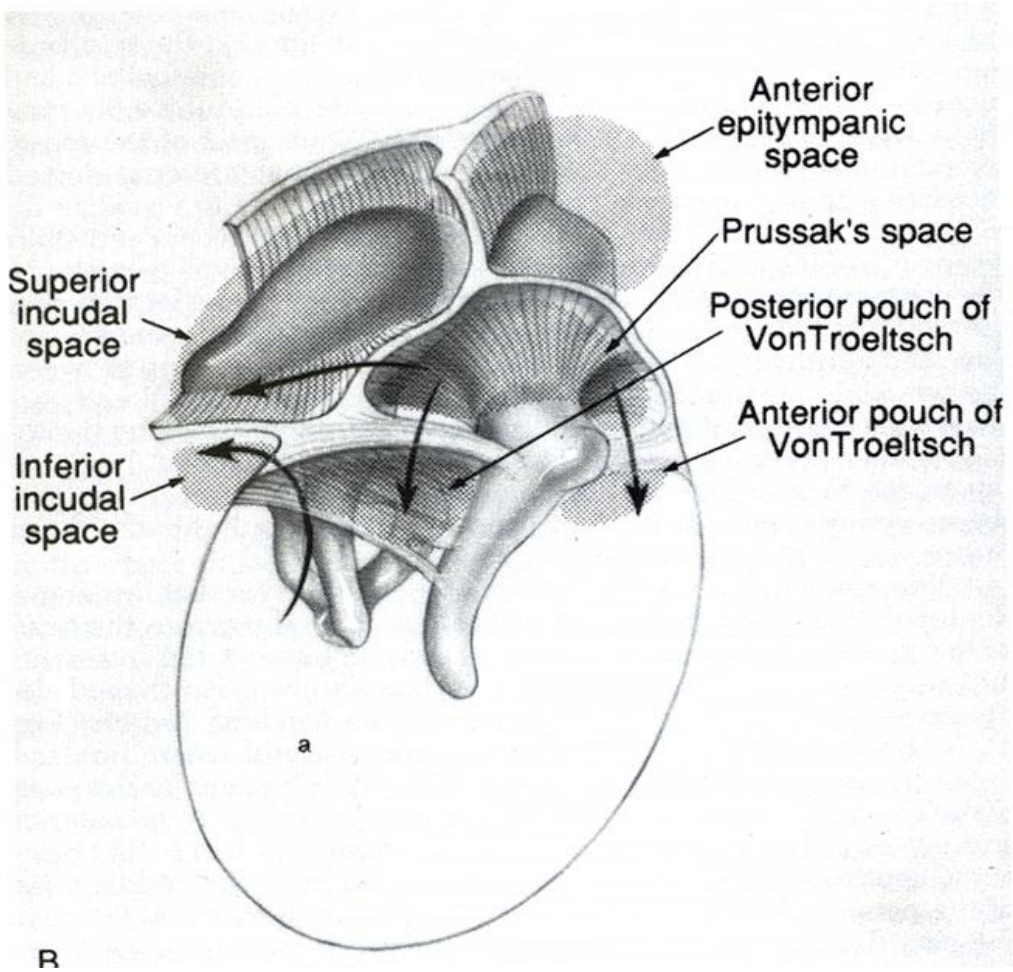
medially. The bony pyramidal process containing the stapedius muscle also lies in this region.



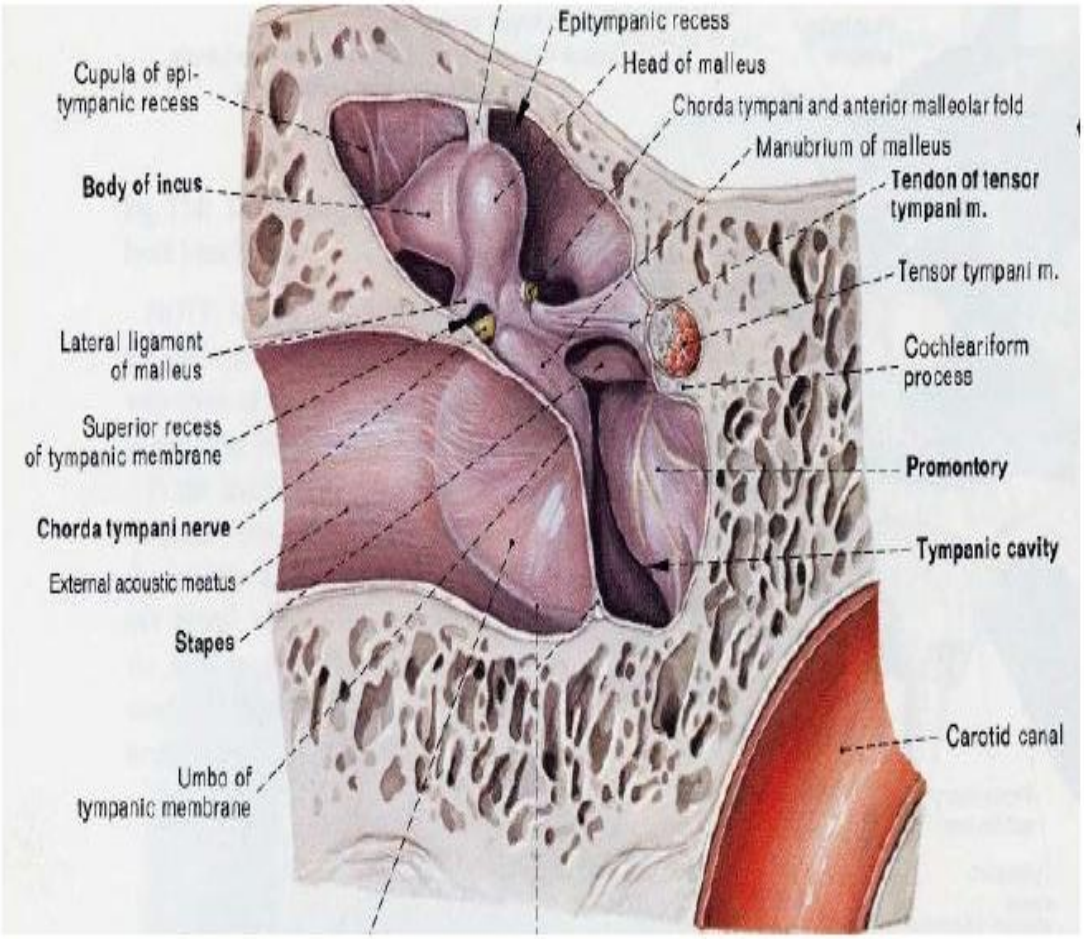
(b) The middle ear

The oval window contains the stapes footplate and the round window is covered by a fibrous membrane that moves in response to middle ear pressure changes or stapes compressions. They directly communicate with the intralabyrinthine compartments that contain perilymph. Thus, these can be sites for leaks of perilymph following direct mechanical or barotrauma. A bony niche overhangs the round window membrane and allows direct access to scala tympani for cochlear implantation. A small bony crest, crista fenestra (semilunaris), can be seen inferiorly when looking at the true round window. The true round window

is most often obscured by a false membrane of mucosa and/or fibrous tissue.



Prussak's space (the superior recess of the tympanic membrane) recognition is critical for understanding Cholesteatoma formation. Shrapnell's membrane serves as the lateral wall; the head and neck of the malleus, the lateral malleal ligament, and anterior and posterior malleal folds form the medial, anterosuperior, and inferior limits.


Epitympanic recess
Cupula of epi-tympanic recess
Head of malleus
Chorda tympani and anterior malleolar fold
Manubrium of malleus
Body of incus
Tendon of tensor tympani m.
Tensor tympani m.
Lateral ligament of malleus
Cochleariform process
Superior recess of tympanic membrane
Promontory
Chorda tympani nerve
Tympanic cavity
External acoustic meatus
Stapes
Carotid canal
Umbo of tympanic membrane

Pneumatization and Air Cell Tracts

Pneumatization can occur in several parts of the temporal bone: the middle ear, the mastoid, the perilabyrinthine regions, and the petrous apex, as well as some accessory areas. The extent of pneumatization varies considerably among individuals. The extent of mastoid pneumatization is often used as a clinical marker for eustachian tube (dys)function. It typically begins in the antrum, extends into the central mastoid area and then into the peripheral mastoid regions. The Perilabyrinthine areas are subdivided into the supralabyrinthine and infralabyrinthine (retrofacial) air cell tracts and the petrous apex comprises the apical and peritubal areas. Accessory regions include the zygomatic arch, the squama, the occipital bone, and the styloid area.

Acoustics and Mechanics of the Middle Ear

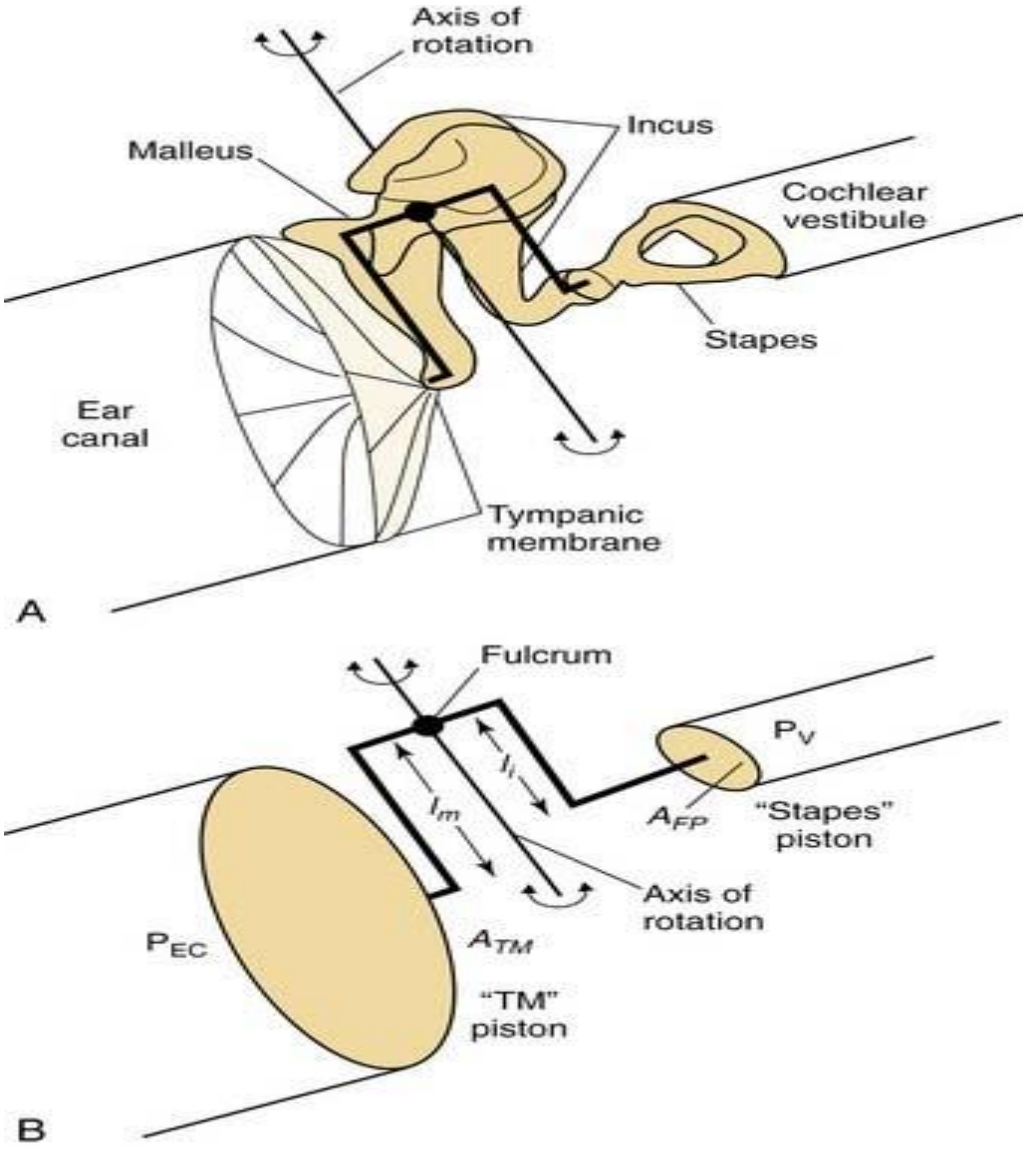
SOUND TRANSMISSION IN THE NORMAL EAR

The External Ear

The external ear, along with the head and body, has a significant influence on the sounds that reach the middle ear. This acoustic function of the external ear, sometimes called the external ear gain, can be described by a frequency and directionally dependent alteration in the sound pressure at the tympanic membrane when compared to the sound pressure in the free field.

The Middle Ear

The middle ear acts as a transformer and couples sound signals from the ear canal to the cochlea primarily through the action of the tympanic membrane and the ossicular chain. It increases sound pressure at the footplate relative to that at the tympanic membrane at the expense of a decrease in stapes volume velocity relative to the tympanic membrane volume velocity. The most important transformer within the middle ear is the ratio of the tympanic membrane area (ATM) to the area of the stapes footplate (AFP). The theoretical (ideal) middle ear gain is 28 dB, whereas the actual (measured) middle-ear gain is only about 20 Db.



At low frequencies, the entire tympanic membrane moves with the same phase, but the magnitude varies. At frequencies above 1,000 HZ, the

patterns of vibration become more complicated with the tympanic membrane breaking up into smaller vibrating portions that vibrate with different phases, decreasing the efficacy of the tympanic membrane as a coupler of sound pressure. The effective stimulus to the inner ear is a difference in sound pressure between the oval and round windows. The middle ear maximizes this window pressure difference via two mechanisms. First, the sound pressure at the oval window of the inner ear is preferentially increased by the tympano-ossicular system. The round window protected or shielded from the sound in the ear canal by the intact tympanic membrane which reduces the sound pressure in the tympanic cavity by 10 to 20 dB compared to the sound pressure in the ear canal. A third protective function of the middle ear is the presence of middle-ear air outside the round window permitting the window to move freely when the inner ear is stimulated by motion of the footplate. These concepts of middle-ear sound pressure gain, round window protection and round window mobility have important practical implications for tympanoplasty.

The Inner Ear

The cochlea is a coiled tube made of three fluid-filled essentially incompressible chambers. Thus, any movement of the stapes footplate within the oval window must be accompanied by fluid motion elsewhere. Over the auditory frequency range, the small fluid-filled cochlear and vestibular aqueducts and other connections between the cochlea and cerebrospinal fluid space are effectively closed. The only compliant membrane covers the round window and permits large motions of the footplate. When the stapes footplate moves in, the round window moves out. The difference in sound pressure at the two cochlear windows due to coupling effect by the incompressible cochlear fluids is important in stimulating the inner ear.

Phase Difference Between the Cochlear Windows

The sound pressure at the oval window is a sum of the pressure produced by the tympano-ossicular system and the acoustic pressure within the middle-ear air space. However, under conditions when the magnitudes of the sound pressures at the oval and round windows are similar with an interrupted ossicular chain is when the phase differences becomes important.

Multiple Pathways for Sound Stimulation of the Inner Ear:

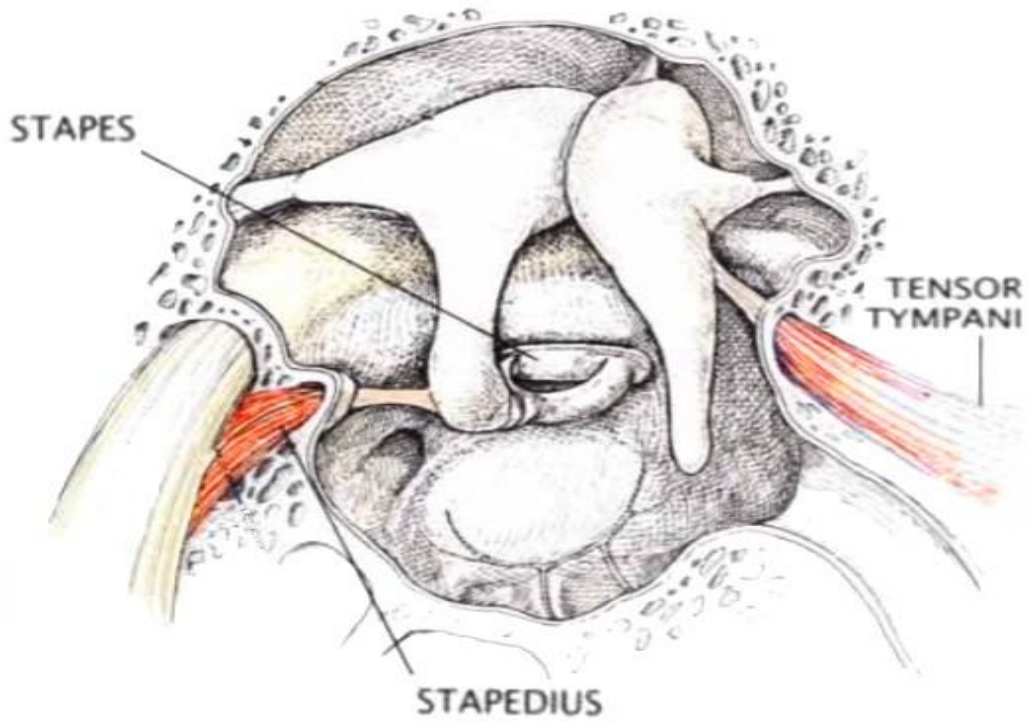
Ossicular coupling is produced by the coupled motion of the tympanic membrane, ossicles and stapes footplate. Acoustic coupling results from middle-ear sound pressure that is produced by ear canal sound pressure and motion of the tympanic membrane. Because the cochlear windows are spatially separated, the sound pressures within the middle ear cavity that act at the oval and round windows, respectively, are not identical. The small differences between the magnitudes and phases of the two window pressures result in a small but measurable difference in sound pressure between the two windows. This difference is called acoustic coupling. In the normal ear, acoustic coupling is quite small and its magnitude is approximately 60 dB less than ossicular coupling.

Audiological Bone Conduction

Sound energy transmitted to the skull by a bone vibrator (eg, a tuning fork or the electromagnetic vibrator of an audiometer) sets the basilar membrane in motion and is perceived as sound. Clinical bone conduction testing is used as a means to determine the functionality of the cochlea.

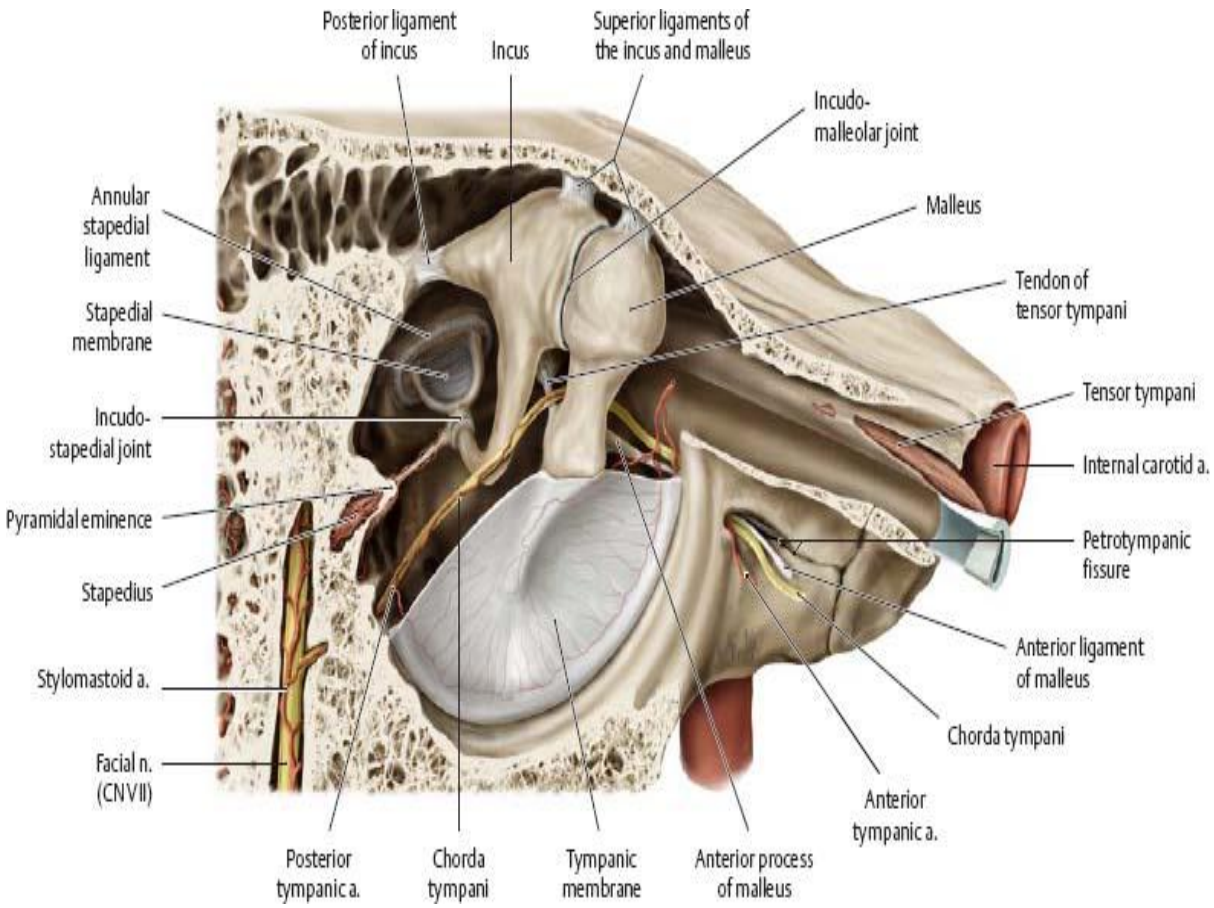
Middle Ear Muscles

The stapedius and tensor tympani muscles contract under a variety of circumstances. Such protective contractions reduce the transmission of low-frequency sound through the middle ear but have little effect on high-frequency sound.Contraction of the stapedeus muscle in response to sound is known as the acoustic reflex.



Middle Ear Joints

The incudomalleal and incudostapedial joints add flexibility to the ossicular system, which allows the middle ear to withstand large variations in the static pressure difference across the tympanic membrane without producing damage to the ear. Ossicular Interruption With an Intact Tympanic Membrane.



When there is ossicular interruption in the presence of an intact drum, ossicular coupling is lost and sound input to the cochlea via the middle ear occurs as a result of acoustic coupling. Since acoustic coupling is smaller than ossicular coupling one would predict that complete ossicular interruption would result in a 60 dB conductive hearingloss.

PATHOPHYSIOLOGY

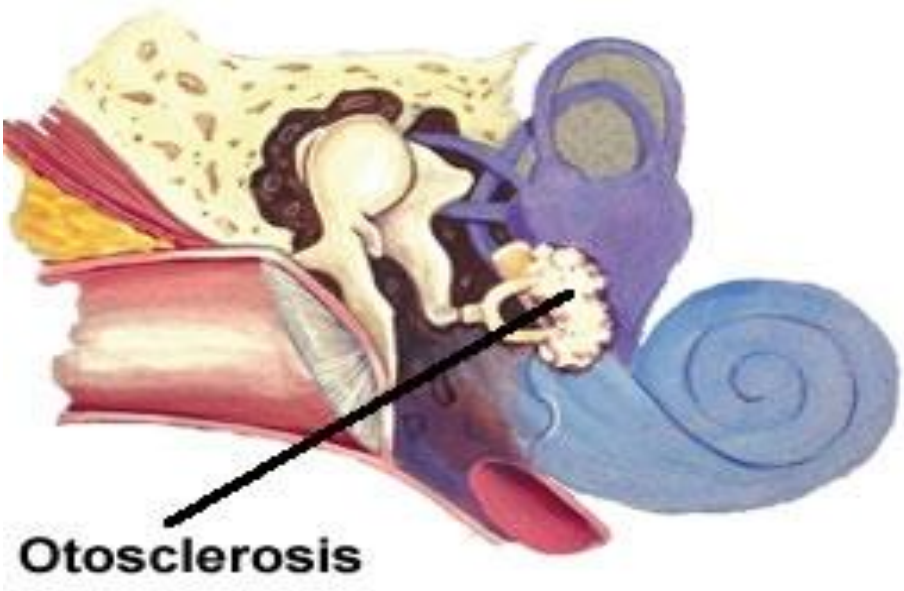
Loss of the Tympanic Mernbrane, Malleus, and Incus

In cases 'where the tyrnpanic membrane, malleus, and incus are lost, the conductive hearing loss is on the order of 40 to 50 dB, ie, this condition results in hearing sensitivities that are to 20 dB superior to cases with an 'intact tympanic mernbrane and Complete ossicular interruption. The loss can be explained by a loss of ossicular coupling together with an enhancement of acoustic coupling by about 10 to 20 dB, as compared to the normal ear. The increase in acoustic coupling due to loss of tympanic membrane shielding also explains why the hearing Of a patient with an interrupted ossicular chain and an intact drum is -Improved by 10 to 20 dB when a perforation is created in the tympanic membrane.

Ossicular Fixation

Partial or complete fixation of the stapes footplate (eg, otosclerosis, -tympanosclerosis, etc.) results in conductive hearing losses that range from '5 dB -to 60 dB depending on the degree of fixation. The losses are greater for the lower frequencies. Fixation of the footplate reduces ossicular coupling by hindering stapes motion, resulting in a conductive 'hearing loss, The amount of hearing loss depends upon the degree of decreased stapes motion. The primary mechanism of conductive loss due to a perforation is a reduction in ossicular coupling caused by a loss in the sound-pressure difference across the tympanic membrane-The sound-pressure difference across the tympanic membrane provides the primary drive to the motion of the drum and ossicles. Perforation-induced physical changes such as reduction in tympanic membrane area or changes in coupling of tympanic membrane motion to the malleus do not appear to contribute significantlv to the hearing loss caused by a perforation. Perforations cause a loss that depends on frequency, perforation size, and middle-ear air space volume.Perforation size is an important determinant of the loss; larger perforations result in larger hearing losses . The volume of the middle-ear air space (combined tympanic cavity and mastoid air volume) is also an important parameter that determines the amount of hearing loss caused by a perforation. It is likely that in the infected

situation, the volume of air in the middle ear and mastoid is reduced compared to the dry state, tympanic membrane perforations lead to an increase in acoustic coupling by 10 to 20 dB due to loss Of the shielding effect of the intact tympanic membrane.



Middle Ear Effusion

Fluid in the middle ear, a primary feature of otitis media with effusion (OME), is associated with a conductive hearing loss of up to 30 to 35 dB. The conductive loss occurs because of a reduction in ossicular coupling due to several mechanisms. At frequencies greater than I,OOO Hz, the loss is caused primarily by mass loading of the tympanic membrane by fluid, with decreases in sound transmission of up to 20 to 30 dB. At frequencies below 1,000 Hz, the hearing loss is due to an increase in impedance of the middle-ear air space resulting from reduced middle-ear air volume, and possibly from negative middle-ear static pressure which is often associated with OME.

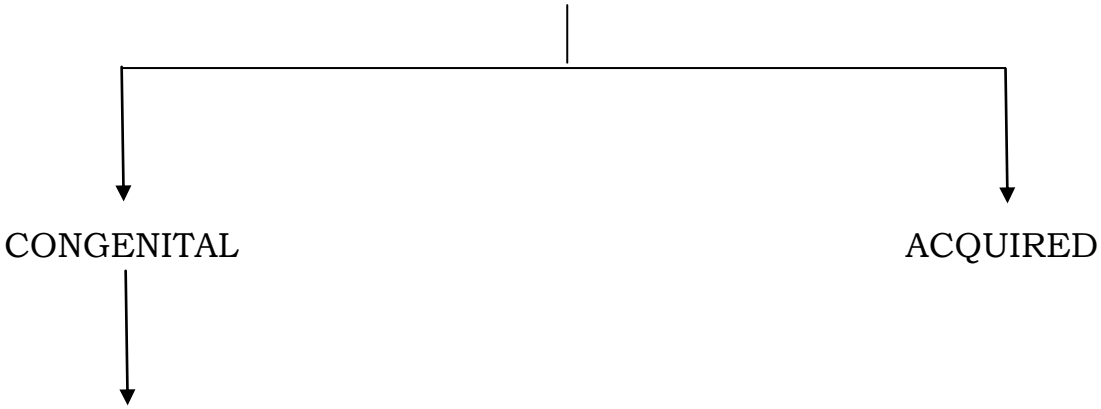
Tympanic Membrane Atelectasis

Atelectasis of the tympanic membrane occurring without a tympanic membrane perforation (and in the presence of intact andmobile ossicles) can result in conductive hearing losses that vary in severity from negligible to 50 dB. The conductive loss can be explained on the basis of a reduction in ossicular coupling due to the tympanic membrane abnormality.

Aeration of the Middle Ear

Clinical experience has shown that nonaerated ears often demonstrate 60-dB air-bone gaps. The large gap in nonaerated ears occurs because (1) ossicular coupling is greatly reduced and (2) stapes motion is reduced because the round window membrane (which is coupled to the stapes by incompressible cochlear fluids) cannot move freely.

CONDUCTIVE HEARING LOSS

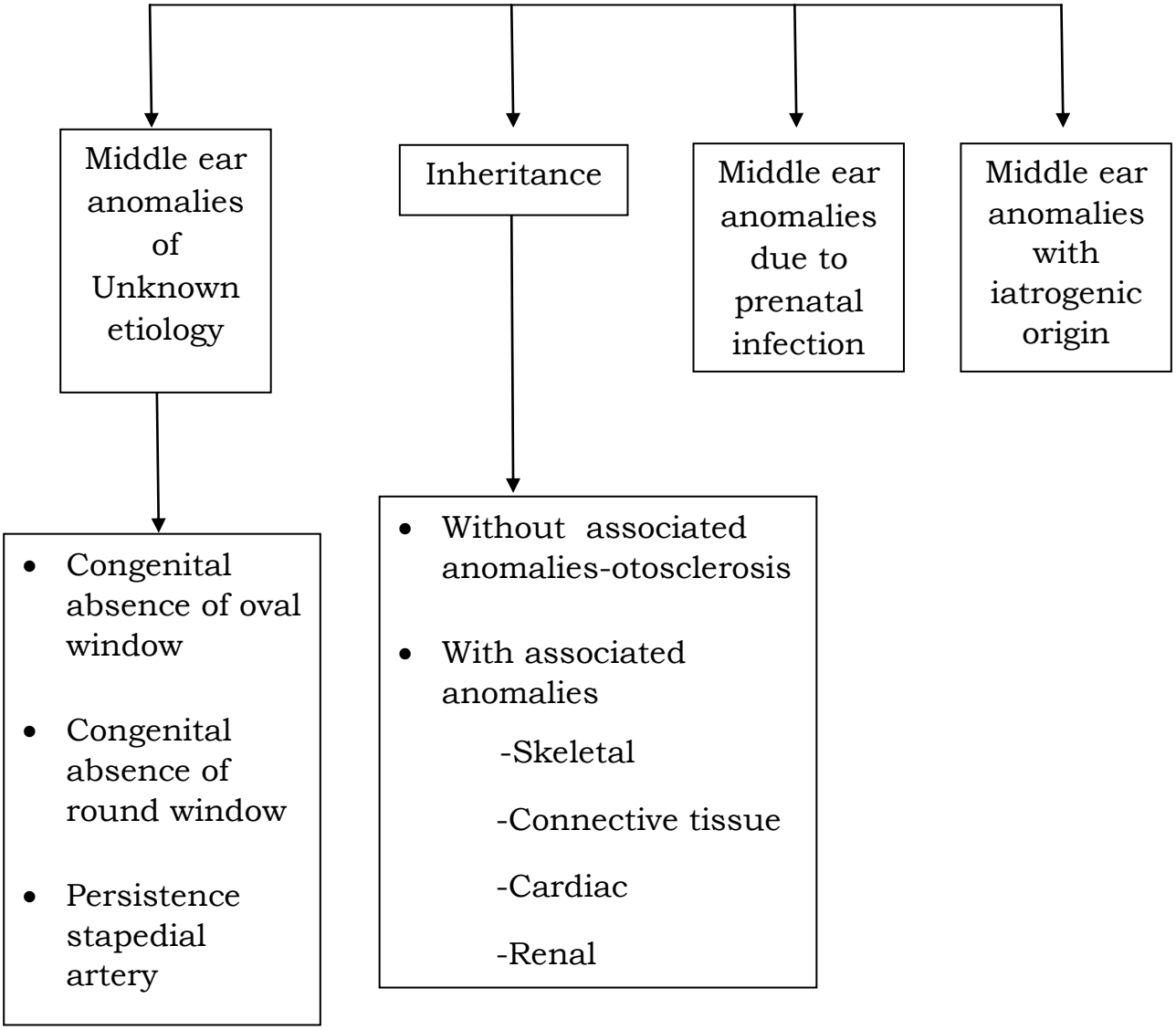


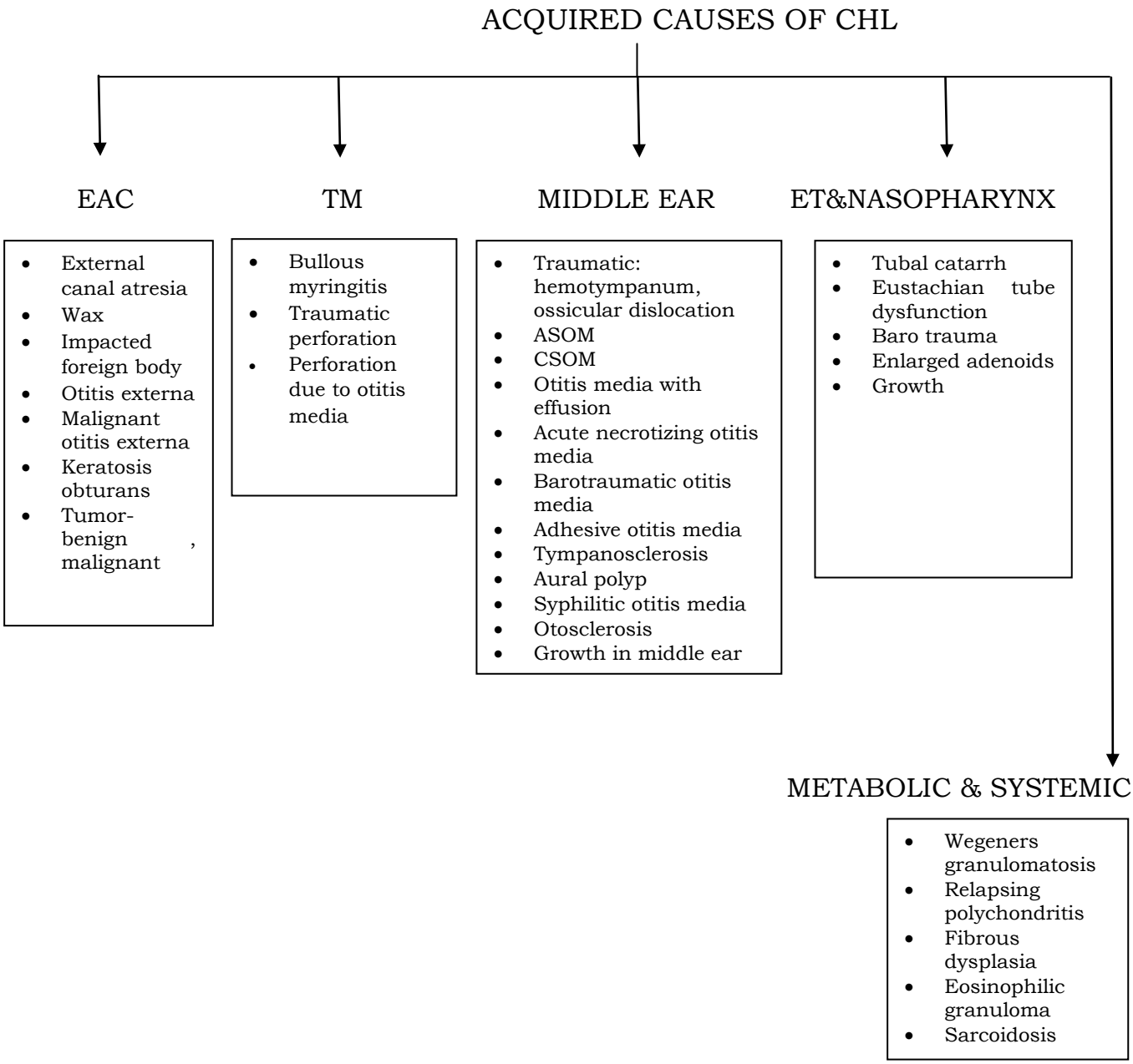
Genetic

Congenital conditions predisposing to CHL

Miscellaneous

GENETIC


Middle ear anomalies of Unknown etiology
Inheritance
Middle ear anomalies due to prenatal infection
Middle ear anomalies with iatrogenic origin
• Congenital absence of oval window
• Congenital absence of round window
• Persistence stapedial artery
• Without associated anomalies-otosclerosis
• With associated anomalies
-Skeletal
-Connective tissue
-Cardiac
-Renal


ACQUIRED CAUSES OF CHL
EAC
External canal atresia
Wax
Impacted foreign body
Otitis externa
Malignant otitis externa
Keratosis obturans
Tumor- benign , malignant
TM
Bullous myringitis
Traumatic perforation
Perforation due to otitis media
MIDDLE EAR
Traumatic: hemotympanum, ossicular dislocation
ASOM
CSOM
Otitis media with effusion
Acute necrotizing otitis media
Barotraumatic otitis media
Adhesive otitis media
Tympanosclerosis
Aural polyp
Syphilitic otitis media
Otosclerosis
Growth in middle ear
ET&NASOPHARYNX
Tubal catarrh
Eustachian tube dysfunction
Baro trauma
Enlarged adenoids
Growth
METABOLIC & SYSTEMIC
Wegeners granulomatosis
Relapsing polychondritis
Fibrous dysplasia
Eosinophilic granuloma
Sarcoidosis

Inactive mucosal COM (dry perforation)

There is a permanent perforation of the pars tensa, but the middle ear and mastoid mucosa is not inflamed. A perforation may be completely surrounded by a remnant of the pars tensa or a part of the perforation may extend to the fibrous annulus . The lamina propria around a perforation is sometimes thickened due to proliferation of fibrous tissue. Squamous epithelium can migrate medially into the middle ear. Although the incidence of medial migration is higher with a perforation that extends to the annulus, medial migration is sometimes also observed in a perforation that is completely surrounded by a remnant of the pars tensa. At the time of tympanoplasty, it is important for an otologic surgeon to excise such ingrown squamous epithelium, which can be recognized by its velvety appearance under the operating microscope.

Active mucosal COM (perforation with otorrhoea)

There is chronic inflammation within the mucosa of the middle ear and mastoid, with varying degrees of oedema, submucosal fibrosis, hypervascularity and infiltration with lymphocytes, plasma cells and histiocy. Areas of the mucosa may ulcerate with proliferation of blood vessels, fibroblasts and inflammatory cells, leading to the formation of granulation tissue. There is production of mucopurulent discharge which

drains via a tympanic membrane perforation. The mucosal changes may progress and coalesce to form 'aural polyps' that can protrude through defects of the tympanic membrane. It is important to realize that the inflammatory changes described above occur not only in the tympanic cavity, but in the entire middle ear cleft including the mastoid antrum and various air cell tracts of the temporal bone. Thus, simple closure of a perforation in active mucosal COM without surgical removal of infected mucosa and granulation tissue from the mastoid is fraught with failure to control the disease. Active mucosal COM is often associated with resorption of parts or all of the ossicular chain ('resorptive osteitis,).The ossicles thus affected typically show hyperemia with proliferation of capillaries and prominent histiocytes . The long process ofthe incus, stapes crurae, body of incus and manubrium are involved in that order of frequency. The reason that the long process of the incus and stapes superstructure are most frequently affected is likely to be due to their delicate structure and location rather than their tenuous blood supply.

It appears that anumber of different triggers such as infection, inflammation, pressure and keratin can lead to elaboration of a variety of molecular factors including cytokines such as interleukin (IL)-I, interleukin-6 and tumour necrosis factor (TNF), other protein mediators such as growth factors, and nonprotein mediators such as prostaglandins, neurotransmitters and nitric oxide. These molecular factors are believed to provide the initiating signals that lead to the recruitment, development and

activation of osteoclasts. These activated osteoclasts then result in bone resorption.

Adhesive Otitis Media

Chronic inactive otitis media with adhesive otitis media comprises a stable, near total, or total retraction of the tympanic membrane onto the promontory, ossicles, and other middle ear structures. Adhesions exist between the eardrum and these structures such that negative insufflation or even tympanostomy tube insertion cannot restore the drum to normal anatomic position. Negative pressure insufflations is accomplished by squeezing the air out of a Siegel pneumatic otoscope bulb before applying it to the ear, thus generating a negative pressure on the tympanic membrane. Adhesive otitis media can be stable, but it is difficult to predict which patients will worsen and go on to develop ossicular erosion from pressure necrosis, infection, or cholesteatoma formation. Pathologically, the tympanic membrane is retracted into the middle-ear space and draped over the incus and stapes. The tympanic membrane thins and loses its lamina propria. An extreme form of adhesive otitis media is called epidermization of the middle ear , and it refers to a transformation of the normal mucosal lining of the middle ear into a squamous epithelial lining. No keratin debris are retained. Epidermization can follow either a profound retraction, which after adhesion development becomes incorporated into the middle-ear lining, or ingrowth of epithelial

cells through an existing perforation, which then carpet the middle ear. Epidermization can involve either a portion of the middle ear or the entire middle ear. Epidermization can remain stable without necessarily evolving into a cholesteatoma. Progression, however, is variable and difficult to predict clinically.

Active squamous epithelial COM

(cholesteatoma)

The hallmark of a cholesteatoma is its retention of keratinous debris. Thus, a 'keratoma' would be histologically a more correct term. Histologically, the squamous epithelial lining or 'matrix' of a cholesteatoma is similar to that of skin. The matrix is usually surrounded by a layer of inflamed, vascular, subepithelial connective tissue. A cholesteatoma can be filled with keratin and be quite dry, or be associated with active bacterial infection leading to profuse malodorous otorrhoea. In addition, inflammatory changes very similar to those described in active mucosal COM can be present throughout the mucosal and submucosal regions of the middle ear cleft in an ear with cholesteatoma. Cholesteatomas are potentially dangerous because of their potential to incite resorption of bone, leading to intratemporal or intracranial complications. The molecular mechanisms by which cholesteatomas trigger bone resorption remain a matter of investigation.

Hearing may vary from normal to total deafness. Occasionally , hearing is found near normal in patients with firm keratoma filling an ossicular chain defect These are called as keratoma hearers.

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TOS CLASSIFICATION FOR PARS FLACCIDA RETRACTION

STAGE 1- the pars flaccida is dimpled and more retracted than normal but not adherent to the malleus.

STAGE 2- the retraction is0 adherent to the neck of the malleus and the full extent of the retraction can be seen

STAGE 3- part of the retraction is out of view and there may be partial erosion of the bony attic wall .

STAGE 4-there is definite erosion of the attic wall with the full extent of the retraction being uncertain because it is out of view.

Chronic Inactive Otitis Media With Retraction Pocket

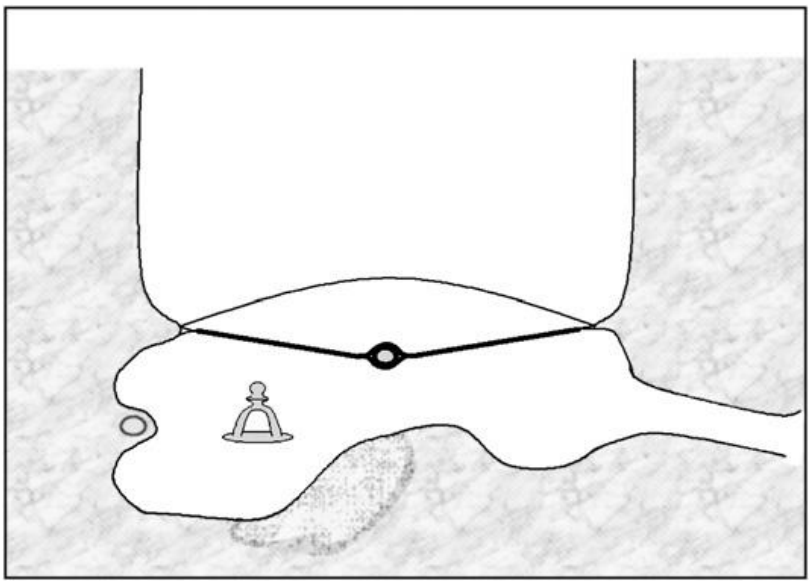
Chronic inactive otitis media with retraction pocket implies that any ongoing inflammation has resolved but a portion of the tympanic membrane is retracted into the middle ear or attic . This situation can result from several conditions. One possibility is chronic Eustachian tube dysfunction, a condition that certainly can persist despite resolution of inflammation. The ensuing negative middle-ear pressure pulls the tympanic membrane medially, creating a retraction pocket. Negative pressure can also occur from a lack of ventilation through the aditus ad

antrum, a so-called attic block. Once a retraction pocket has developed, a subclinical inflammatory state can evolve in the epithelial tissue, resulting in adhesions that together the tympanic membrane to the ossicles, promontory mucosa, or medial aspect of the scutum.

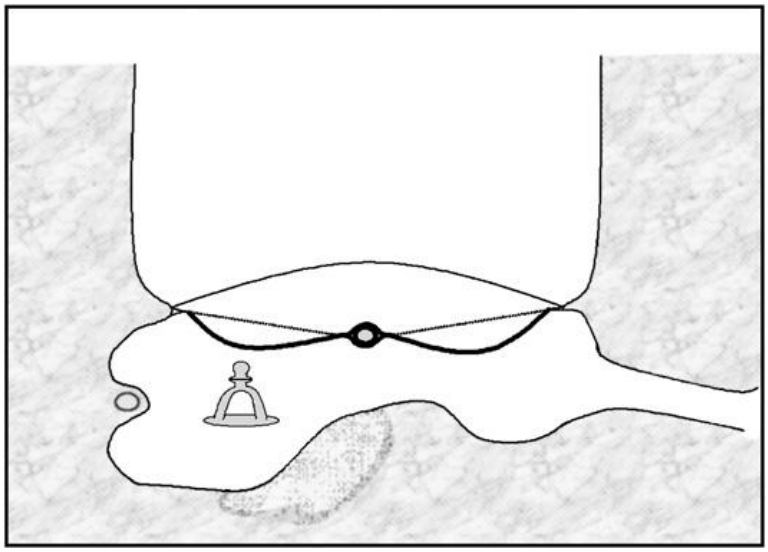
When a substantial portion of the tympanic membrane retracts and becomes adherent to the medial wall of the middle ear, it is termed adhesive otitis media Although retraction pockets are often precursors to cholesteatoma, some retraction pockets are quite stable and do not progress to cholesteatoma, even over a long period of time. A retraction pocket, by definition, does not have the retention keratin debris that is pathognomonic for cholesteatomas. Retraction pockets can involve any portion of the eardrum; but most often they involve the attic, the posterior quadrant, or a combination of both and is called a posteriorsuperior retraction pocket. Once a retraction pocket extends beyond clinical view, observation alone is deemed unwise as progression can go undetected. Such a retraction pocket can be an indication for surgical intervention even in the absence of overt cholesteatoma formation.

RECOMMENDATIONS FOR MANAGEMENT FOR AN INACTIVE RETRACTION

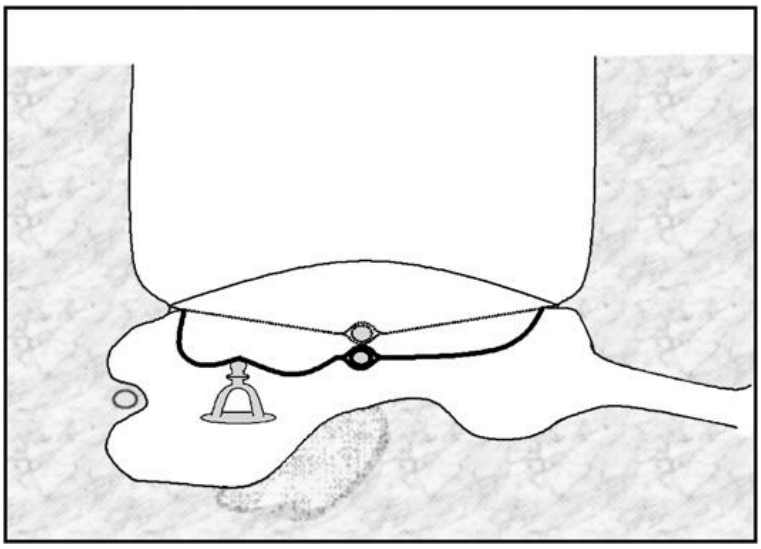
If the patient is an adult (over the age of 12) the Eustachian tube function is likely to be normal and the retraction has a substantial chance of being stable. If there is no significant hearing loss and the retraction pocket is self-cleansing, then follow-up on an occasional basis would be appropriate. If the retraction pocket is not self cleansing, then it may be managed with regular microscopic suction clearance. If there is a conductive hearing impairment, this may be due to loss of effectiveness of the atelectatic tympanic membrane or an ossicular problem. The decision to manage this surgically will depend upon the wishes of the patient, the hearing in the other ear and the expertise of the surgeon. The eardrum may be reconstructed, with a temporalis fascia graft, or, as is now more commonly performed, a graft with a cartilagenous component to help prevent recurrence of retraction. An ossiculoplasty would also be performed where relevant.



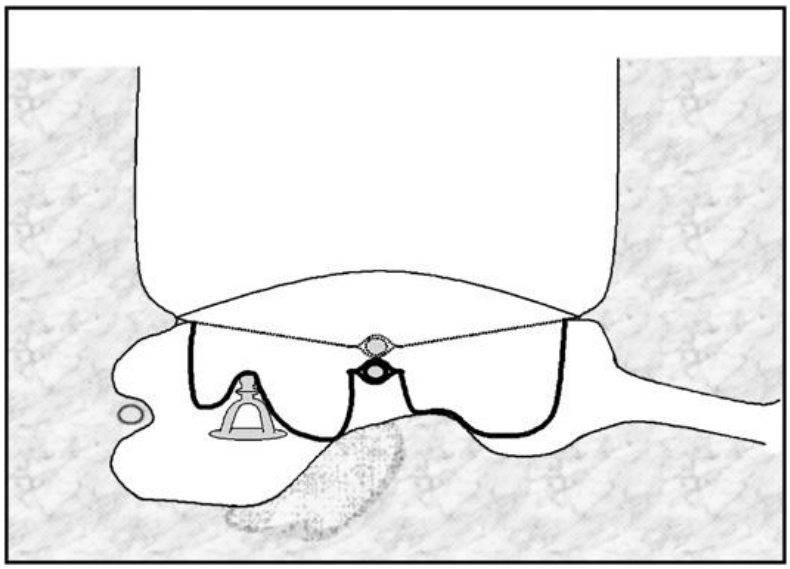
NORMAL EAR



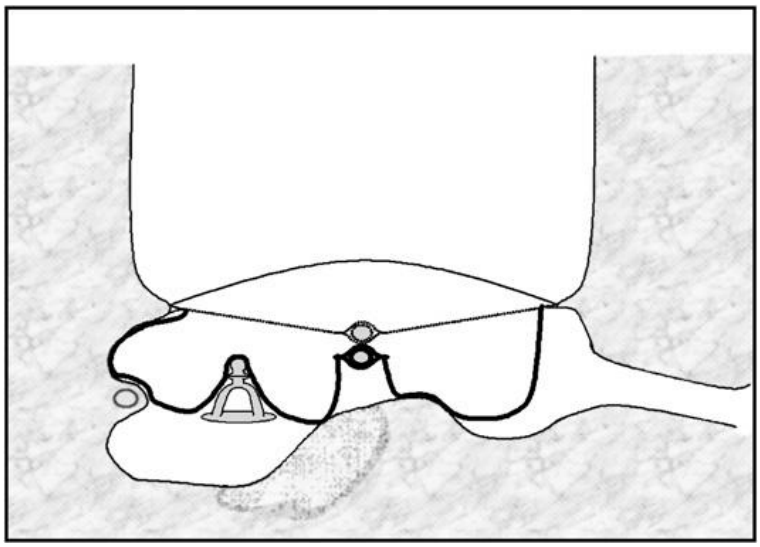
Grade one atelectatic ear. All or a portion of the drum is retracted, but does not touch any middle ear structures. All aspects of the drum are visible



Grade two atelectatic ear. The drum is retracted and draped over the incus or stapes. The drum is not touching the promontory. All aspects of the drum are visible.



Grade three atelectatic ear. The same as grade two, but the drum is now touching the promontory. All aspects of the drum are visible



Grade four atelectatic ear. The same as grade three, but the drum is now retracted around a corner. All aspects of the drum are not visible

Classification and treatment of middle ear atelectasis

Atelectasis grade Treatment

1 - Observation, Valsalva, nasal steroids as needed

2 - Observation, Valsalva, nasal steroids as needed

3 - Observation, Valsalva, nasal steroids as needed

- Consider pressure equalization tube if drum fails to improve

- Consider tympanoplasty if drum is adherent cartilage

4 - Cartilage tympanoplasty, mastoidectomy as needed

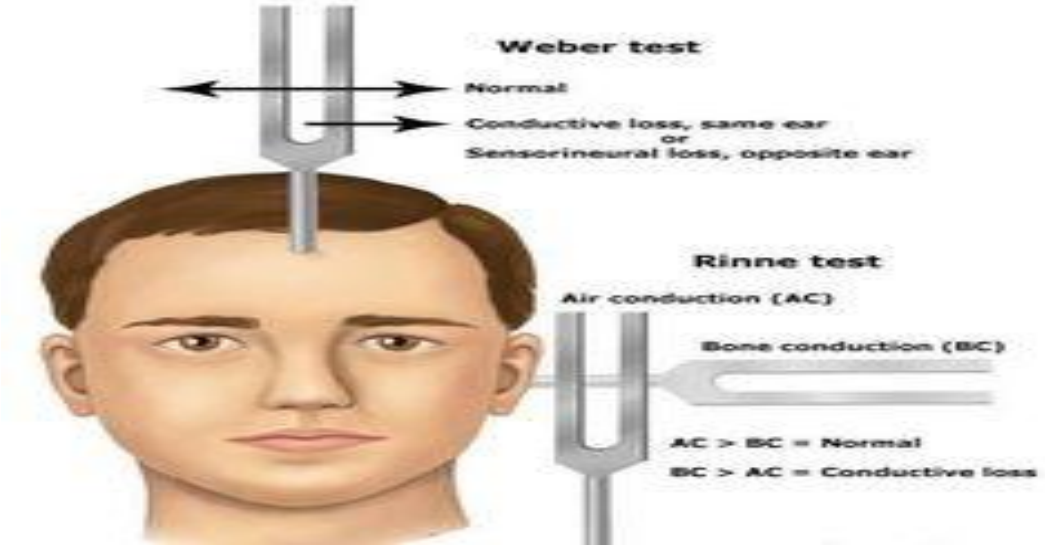
INVESTIGATIONS

We can assess conductive hearing loss by clinically and audiological methods. Clinically By using tuning fork tests, audiological methods includes PTA & Impedance Audiometry.

Tuning Fork Tests

A tuning fork examination is performed easily at the bedside or in the office. It is an important component of the neurotologic evaluation. It is particularly recommended to confirm audiometric findings before undertaking surgery for conductive hearing loss, especially stapedectomy. To perform a Weber's test, a vibrating tuning fork (512 Hz) is placed on the midline of the patient (the forehead, nasal dorsum, central incisors of the maxilla, or mandibular symphysis) to conduct the tone directly to the cochlea. It is important to strike the tuning fork on a soft surface to prevent the development of high- frequency overtones, as may occur when striking the fork on a hard surface. A patient who hears the tone more clearly in one ear is said to have lateralized to that ear. If the sound does not lateralize, then the test is reported as midline or normal. As a rule, sound lateralizing to one ear implies either an ipsilateral conductive loss (typically 3 to 5 dB with a 512 Hz fork) or a contralateral sensorineural loss. Patients with a unilateral conductive hearing loss are sometimes

hesitant to acknowledge hearing a tone louder in the "bad" ear. Although a Weber's test is a reliable and trusted test, its acoustic basis is unclear. that ear cannot be properly masked without' knowledge of its air- and bone-conduction thresholds. Generally, a middle _ ear disorder manifests as an air-bone gap on the audiogram. A disorder that adds mass to the system influences higher frequencies; a disorder that adds or subtracts stiffness affects the lower frequencies. Although the presence of middle-ear disorder is correlated with conductive hearing loss, the correlation is not perfect. The measurement of air- and bone- conduction thresholds is not as sensitive to middle-ear disorder as immittance audiometry or other measures. Middle-ear disorder can exist without an air-bone gap. Nevertheless, a middle-ear disorder is likely to result in some degree of conductive hearing loss, and pure-tone audiometry can serve as a useful quantification of pre- and post treatment function.



MATERIALS AND METHODS

STUDY PLACE : Rajiv Gandhi Government General Hospital, Chennai – 600003.

COLLABORATING DEPARTMENT: Upgraded Institute of Otorhinolaryngology

STUDY DESIGN : Retrospective and Prospective study

STUDY PERIOD : NOVEMBER 2014 TO AUGUST 2016

INCLUSION CRITERIA :

1.Age between 13 – 55 years

2.Both sexes (male and female)

3.Patients with Conductive hearing loss willing to undergo surgery

4.Patient who all are fit for surgery

EXCLUSION CRITERIA :

1.Age below 13yrs and above 55yrs

2.Sensory neural hearing loss, mixed hearing loss

3.Patient not fit for surgery

4.Congenital anomalies

INVESTIGATION:

1.Examination on table Findings

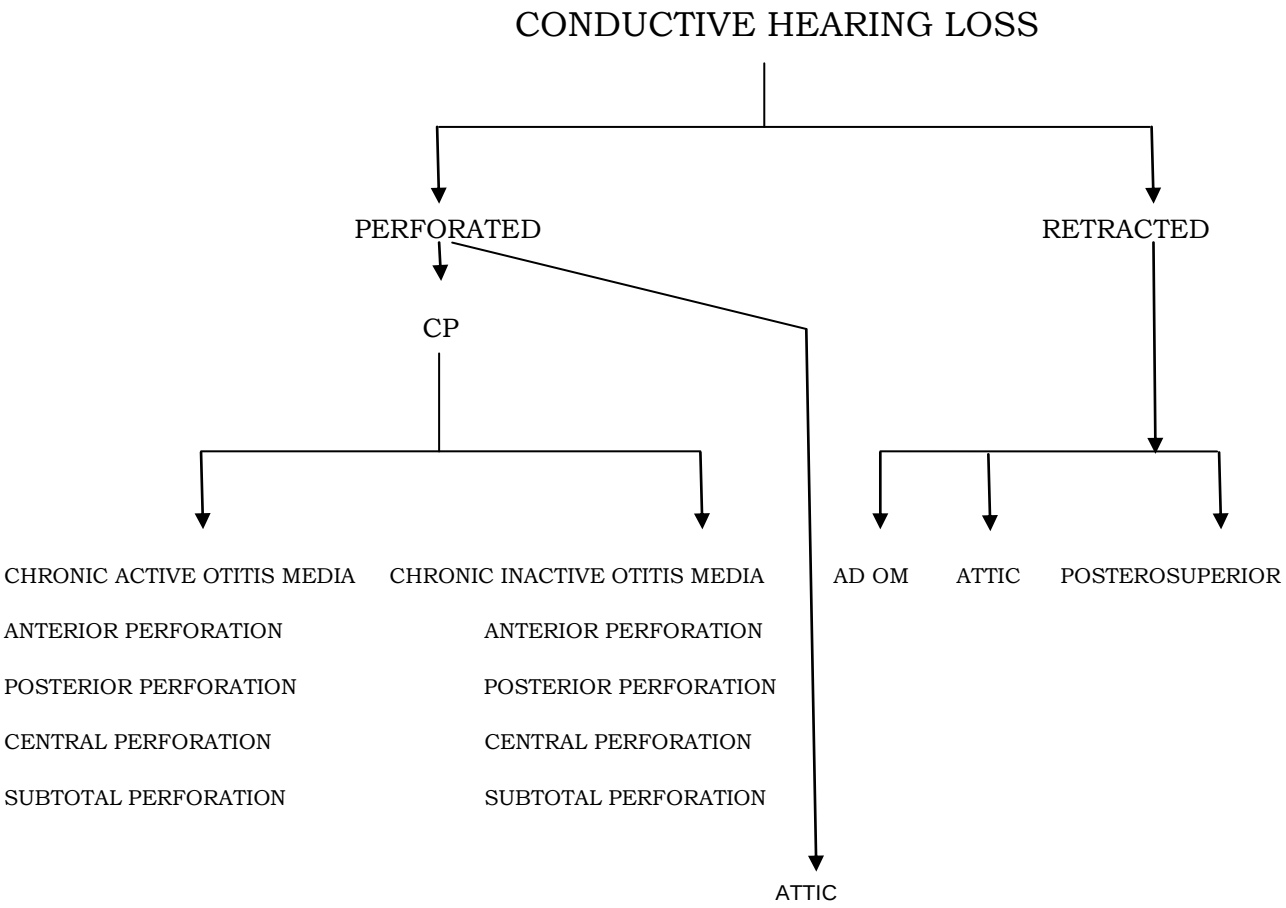
2.Pure tone audiometry

3.Impedance Audiometry

4.XRAY Mastoid

ETHICAL COMMITTEE APROVAL

Institutional Ethical Committee, Government General Hospital , Madras Medical College, Chennai reviewed the experimental design and protocol as well as the letter of information and consent form.Full approval of the board was granted. All patients were given information outlining the experimental protocol and all the patients signed a consent form prior to entering the study.

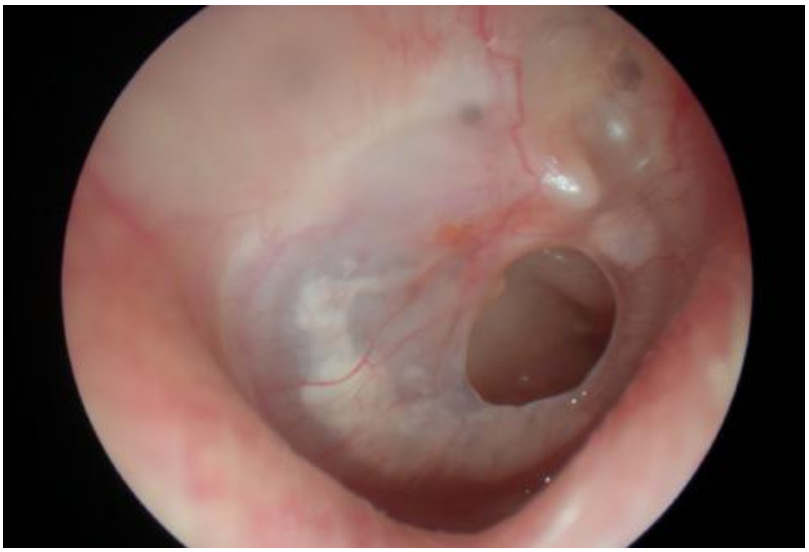

CONDUCTIVE HEARING LOSS
PERFORATED
RETRACTED
CP
CHRONIC ACTIVE OTITIS MEDIA
ANTERIOR PERFORATION
POSTERIOR PERFORATION
CENTRAL PERFORATION
SUBTOTAL PERFORATION
CHRONIC INACTIVE OTITIS MEDIA
ANTERIOR PERFORATION
POSTERIOR PERFORATION
CENTRAL PERFORATION
SUBTOTAL PERFORATION
ATTIC
AD OM
ATTIC
POSTEROSUPERIOR

After getting the approval from the ethical committee, this study was conducted. This study was carried out in our tertiary care hospital affiliated to a teaching institute. The period of the study from Nov 2014 to Aug 2016.

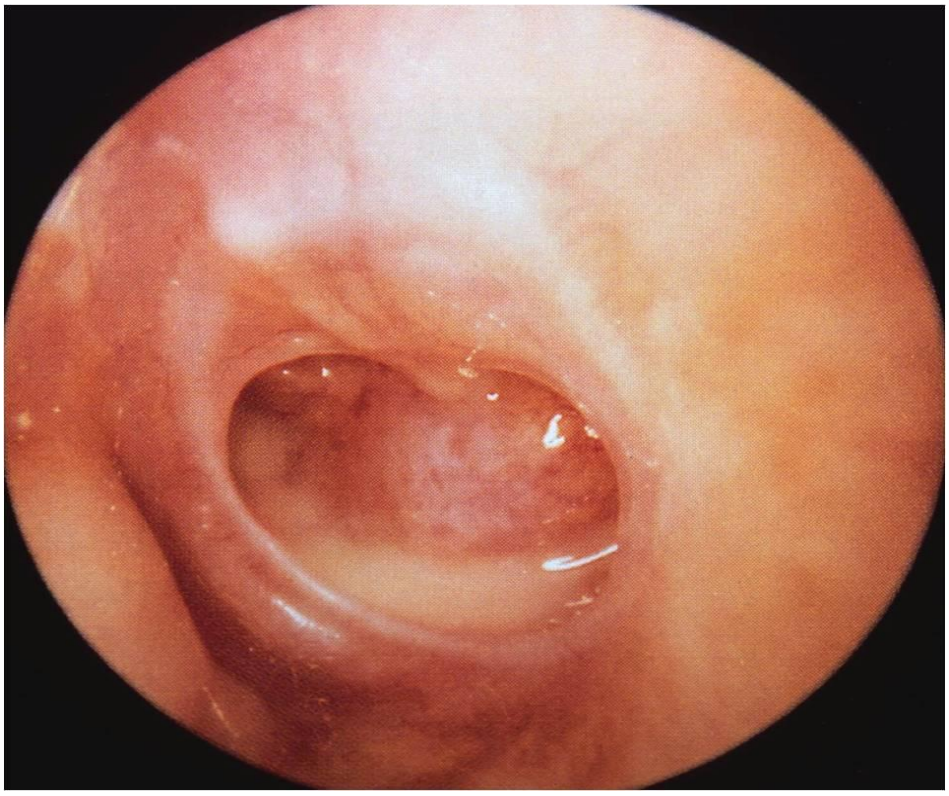
Patients were diagnosed as conductive hearing loss by detailed history and ENT Examination. The total number of patients included in the study were 80, between the ages of 13-55 years. Patients with conductive hearing loss with perforated tympanic membrane , retracted tympanic membrane were included in this study.

We categorized the patients into 2 groups according to their tympanic membrane status. The first group belongs to patient with perforated tympanic membrane. Under this group the patient were categorized into 2 categories. First category of patients included Chronic active otitis media characterized by irreversible tympanic membrane perforation with otorrhoea more than 6 weeks. The second category of patients included Chronic inactive otitis media characterized by irreversible tympanic membrane perforation without otorrhoea.

POSTERIOR PERFORATION



ANTERIOR PERFORATION



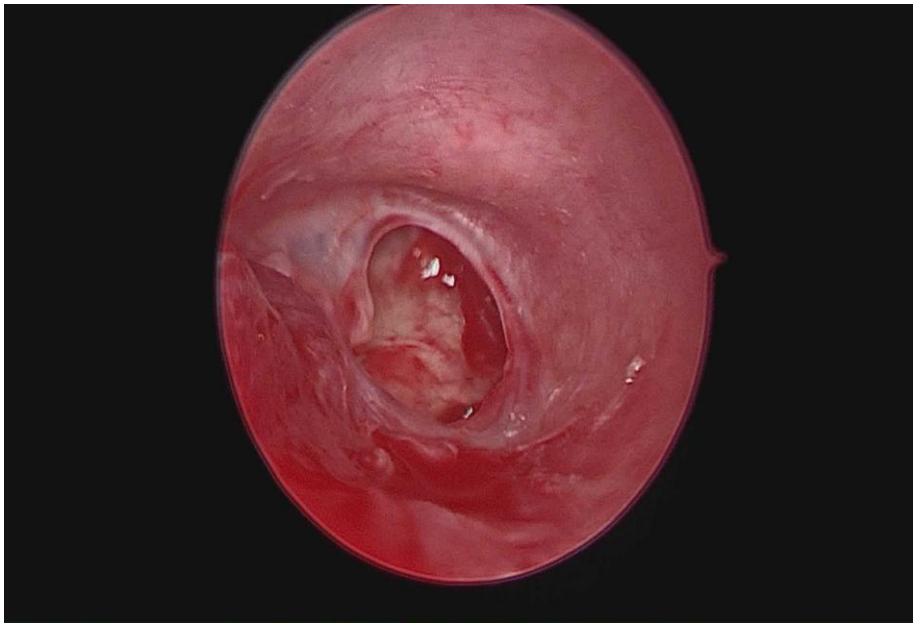
CENTRAL PERFORATION

Perforation were grouped into 4 types, Anterior central, posterior central, central perforation and subtotal perforation based on their position. Site of perforation was determined by demarcation with the vertical line passing through the handle of malleus. Perforation anterior to this line grouped as anterior central perforation , perforation posterior to this line grouped as posterior central perforation. Perforation involving the inferior quadrants- antero interior and postero inferior quadrants grouped as central perforation. Perforation involving more than 2 quadrants or >50%of tympanic membrane (pars tensa) grouped as subtotal perforation.

Patients with conductive hearing loss with retracted tympanic membrane are grouped separately. They are regrouped into adhesive otitis media , attic retraction and postero superior retraction.

Status of the ossicular chain is classified into intact & mobile, erosion and fixed. Ossicular involvement is termed as Ossicular Chain Suffering(OCS).

Audiometric assessment was performed by using clinical audiomenter, and patients with intact tympanic membrane underwent impedance audiometry. Hearing level was taken as the mean air conduction threshold at 500Hz, 1000Hz, 2000Hz & 4000Hz, from the air conduction threshold level their deafness were categorized according to WHO classification. Normal hearing level (0-25db), mild(26-40db), moderate (41-55db), moderately severe(56-70db), severe(71-90db), profound(>90db).



SUBTOTAL PERFORATION

Type of the hearing loss of the patients were classified as conductive hearing loss when the bone conduction threshold within normal limits and the airconduction threshold over 20db.

Impedance audiometric findings were grouped into A,As,Ad, B type of curve. Patients with conductive hearing loss and with this type of curves were taken to surgery.

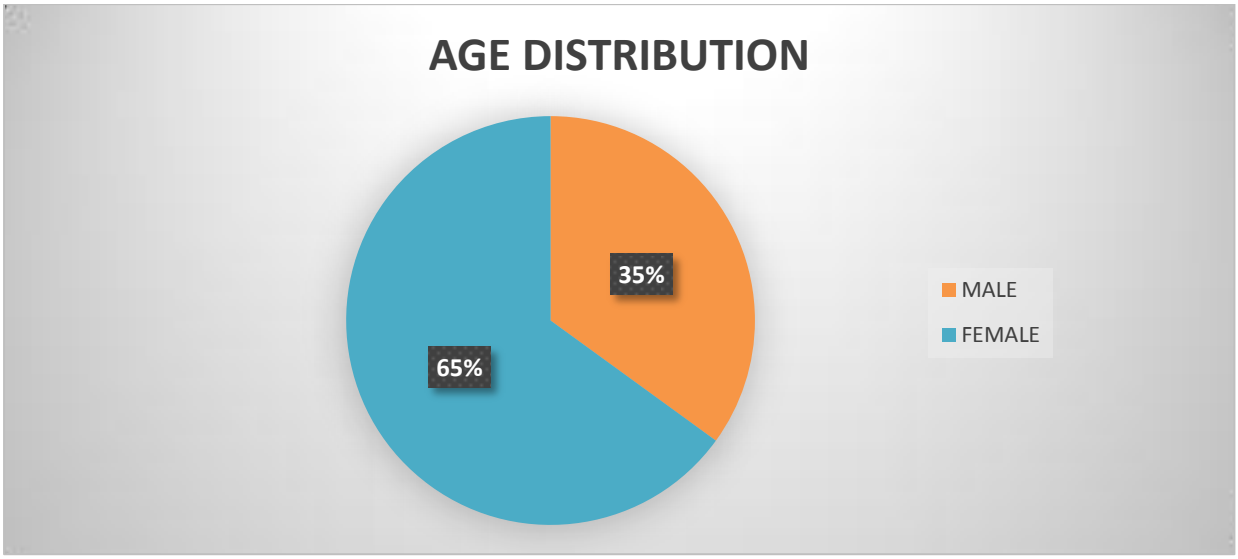
Patients were assessed by previously described procedures and were taken to surgery. Cortical mastoidectomy, tympanoplasty, Functional Endoscopic Ear surgery , Atticotomy and Cartilage tympanoplasty these were the procedures performed.

Status of the middle ear mucosa was also taken in this study. And this was classified into normal & polypoidal mucosa.

RETRACTED TM

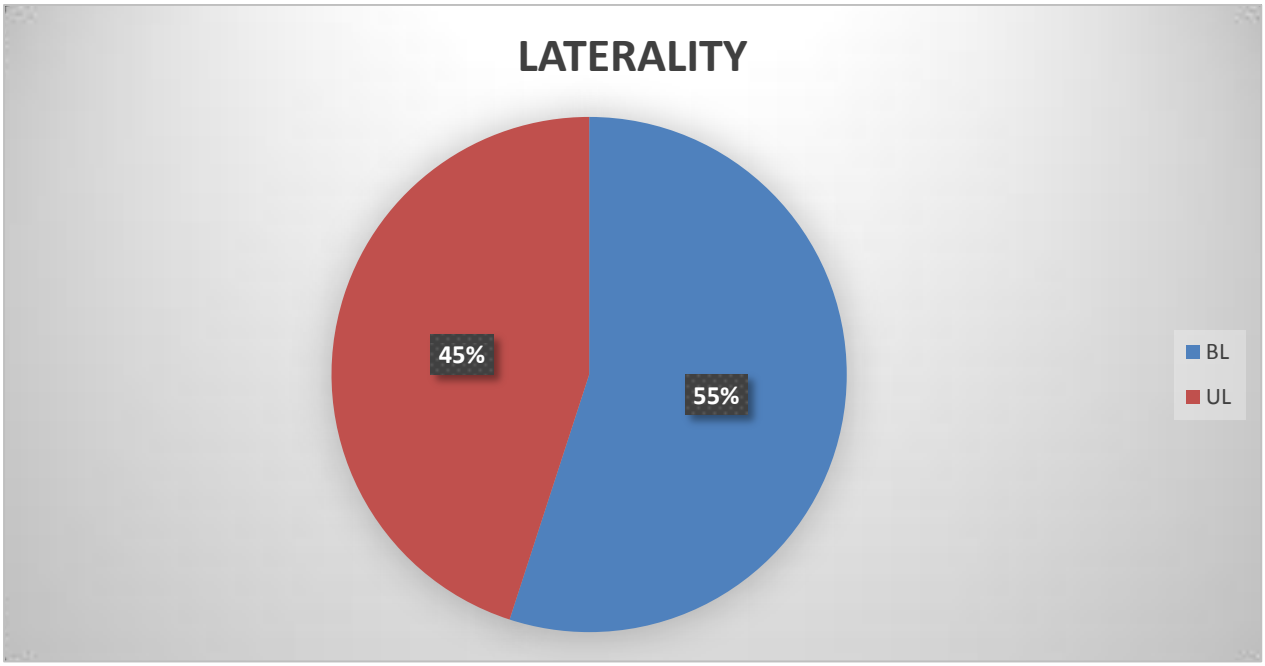
STATISTICAL DATA

	Frequency	Percent	Valid Percent	Cumulative Percent
MALE	28	35	35	35
FEMALE	52	65	65	100
Total	80	100	100	

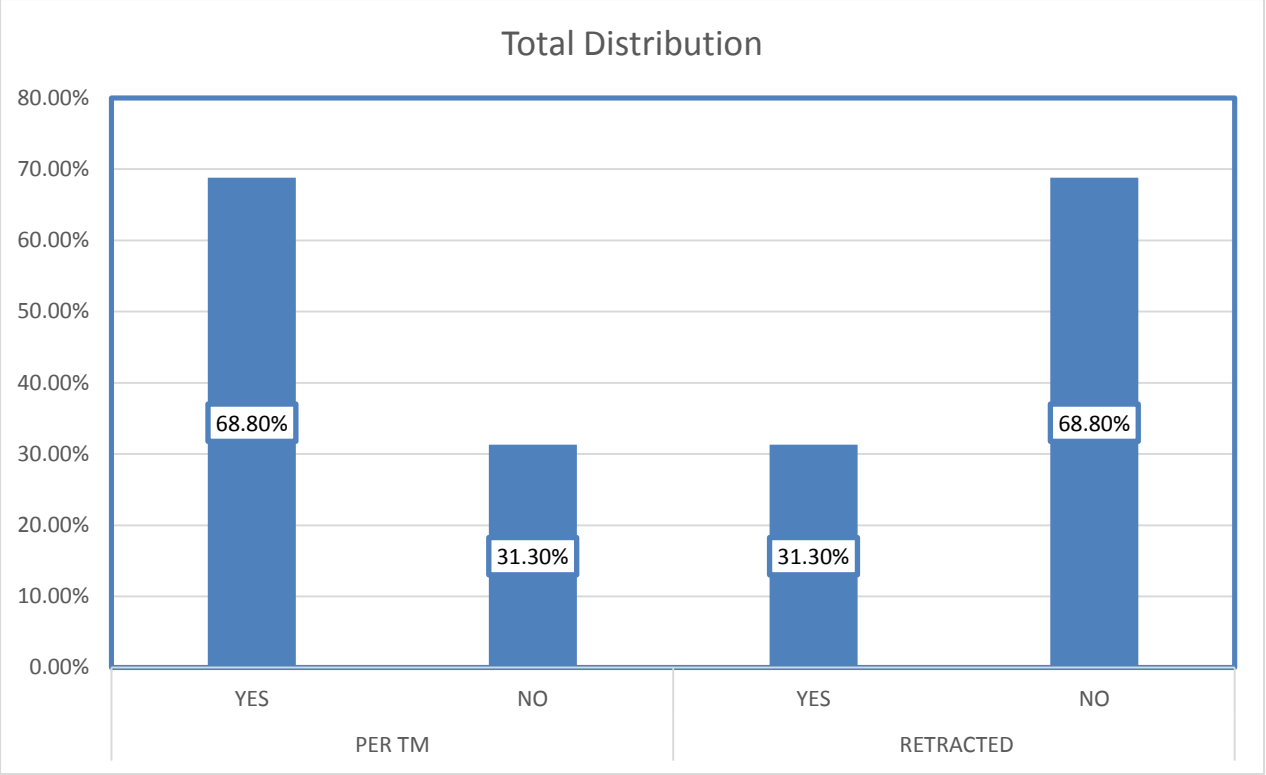


LATERALITY

	Frequency	Percent	Valid Percent	Cumulative Percent
BL	44	55.0	55.0	55.0
UL	36	45.0	45.0	100.0
Total	80	100.0	100.0	



		Frequency	Percent	Valid Percent	Cumulative Percent
PER TM	YES	55	68.8	68.8	31.3
	NO	25	31.3	31.3	100
RETRACTED	YES	25	31.3	31.3	31.3
	NO	55	68.8	68.8	100


Total Distribution
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
68.80%
31.30%
31.30%
68.80%
YES
NO
YES
NO
PER TM
RETRACTED

OSSICULAR STATUS & MIDDLE EAR FINDINGS IN PERFORATION

			OSSICLES										MID EAR							
			INCUS		M,I,S		NOR		STAPES				GRANULATION		GRANULATION,CHOLESTEATOMA		NOR		POLYPOIDAL	
			n	n%	n	n%	n	n%	n	n%			n	n%	n	n%	n	n%	n	n%
PER Act	PER ANT	YES	0	0%	0	0%	5	25%	0	0%	PER ANT	YES	0	0%	0	0%	3	37.50%	2	11.10%
		NO	6	100.00%	0	0.00%	15	75.00%	0	0.00%		NO	0	0.00%	0	0.00%	5	62.50%	16	88.90%
	PER POS	YES	0	0.00%	0	0.00%	4	20.00%	0	0.00%	PER POS	YES	0	0.00%	0	0.00%	2	25.00%	2	11.10%
		NO	6	100.00%	0	0.00%	16	80.00%	0	0.00%		NO	0	0.00%	0	0.00%	6	75.00%	16	88.90%
	PER CEN	YES	0	0.00%	0	0.00%	6	30.00%	0	0.00%	PER CEN	YES	0	0.00%	0	0.00%	2	25.00%	4	22.20%
		NO	6	100.00%	0	0.00%	14	70.00%	0	0.00%		NO	0	0.00%	0	0.00%	6	75.00%	14	77.80%
	PER * SUB	YES	6	100.00%	0	0.00%	5	25.00%	0	0.00%	PER SUB	YES	0	0.00%	0	0.00%	1	12.50%	10	55.60%
		NO	0	0.00%	0	0.00%	15	75.00%	0	0.00%		NO	0	0.00%	0	0.00%	7	87.50%	8	44.40%
PER INACT	PER ANT	YES	1	100.00%	0	0.00%	4	14.80%	0	0.00%	PER ANT	YES	0	0.00%	0	0.00%	3	17.60%	2	16.70%
		NO	0	0.00%	0	0.00%	23	85.20%	1	100.00%		NO	0	0.00%	0	0.00%	14	82.40%	10	83.30%
	PER POS	YES	0	0.00%	0	0.00%	4	14.80%	0	0.00%	PER POS	YES	0	0.00%	0	0.00%	2	11.80%	2	16.70%
		NO	1	100.00%	0	0.00%	23	85.20%	1	100.00%		NO	0	0.00%	0	0.00%	15	88.20%	10	83.30%
	PER CEN	YES	0	0.00%	0	0.00%	15	55.60%	0	0.00%	PER CEN	YES	0	0.00%	0	0.00%	8	47.10%	7	58.30%
		NO	1	100.00%	0	0.00%	12	44.40%	1	100.00%		NO	0	0.00%	0	0.00%	9	52.90%	5	41.70%
	PER ** SUB	YES	0	0.00%	0	0.00%	4	14.80%	1	100.00%	PER SUB	YES	0	0.00%	0	0.00%	4	23.50%	1	8.30%
		NO	1	100.00%	0	0.00%	23	85.20%	0	0.00%		NO	0	0.00%	0	0.00%	13	76.50%	11	91.70%

*** Indicats the significnce level at the point p<0.001** **** Indicats the significnce level at the point p<0.05**

HEARING LEVEL & DURATION IN PERFORATION

			PTA				DURATION	
			Mean	Standard Deviation			Mean	Standard Deviation
PER ACT	PER ANT	YES	32.32	4.57	PER ANT	YES	5.6	2.61
		NO	37.04	9.5		NO	8.62	6.65
	PER POS	YES	31.97	3.87	PER POS	YES	7.25	5.68
		NO	36.89	9.39		NO	8.18	6.36
	PER CEN**	YES	29.43	4.42	PER CEN	YES	5.17	4.07
		NO	38.14	8.97		NO	8.9	6.5
	PER SUB**	YES	43.03	9.04	PER SUB**	YES	11	7.51
		NO	31.07	4.26		NO	5.87	3.94
PER INACT	PER ANT	YES	34.44	9	PER ANT	YES	2.9	1.6
		NO	33.15	5.7		NO	6.23	3.88
	PER POS	YES	31.5	3.87	PER POS**	YES	9.75	6.08
		NO	33.67	6.51		NO	5	2.98
	PER CEN	YES	31.61	4.78	PER CEN	YES	5.57	2.96
		NO	35.26	7.13		NO	5.75	4.64
	PER SUB**	YES	39.1	6.28	PER SUB	YES	5.4	3.65
		NO	32.18	5.6		NO	5.71	3.89

*** Indicats the significnce level at the point p<0.001** **** Indicats the significnce level at the point p<0.05**

		OSSICLES										MID EAR							
		INCUS		M,I,S		NOR		STAPES				GRANULATION		GRANULATION,CHOLESTEATOMA		NOR		POLYPOIDAL	
		n	n%	n	n%	n	n%	n	n%			n	n%	n	n%	n	n%	n	n%
PER ACT	YES	6	85.70%	0	0.00%	20	42.60%	0	0.00%	PER ACT**	YES	0	0.00%	0	0.00%	8	32.00%	18	60.00%
	NO	1	14.30%	0	0.00%	27	57.40%	1	100.00%		NO	0	0.00%	0	0.00%	17	68.00%	12	40.00%
PER INACT	YES	1	14.30%	0	0.00%	27	57.40%	1	100.00%	PER INACT	YES	0	0.00%	0	0.00%	17	68.00%	12	40.00%
	NO	6	85.70%	0	0.00%	20	42.60%	0	0.00%		NO	0	0.00%	0	0.00%	8	32.00%	18	60.00%

*** Indicats the significnce level at the point p<0.001** **** Indicats the significnce level at the point p<0.0**

HEARING LEVEL & DURATION IN PERFORATION

		PTA				DURATION	
PER TM		Mean	Standard Deviation			Mean	Standard Deviation
PER ACT	YES	36.13	8.89	PER TM	PER ACT**	8.04	6.16
	NO	33.37	6.2			5.66	3.79
PER INACT**	YES	33.37	6.2		PER INACT	5.66	3.79
	NO	36.13	8.89			8.04	6.16

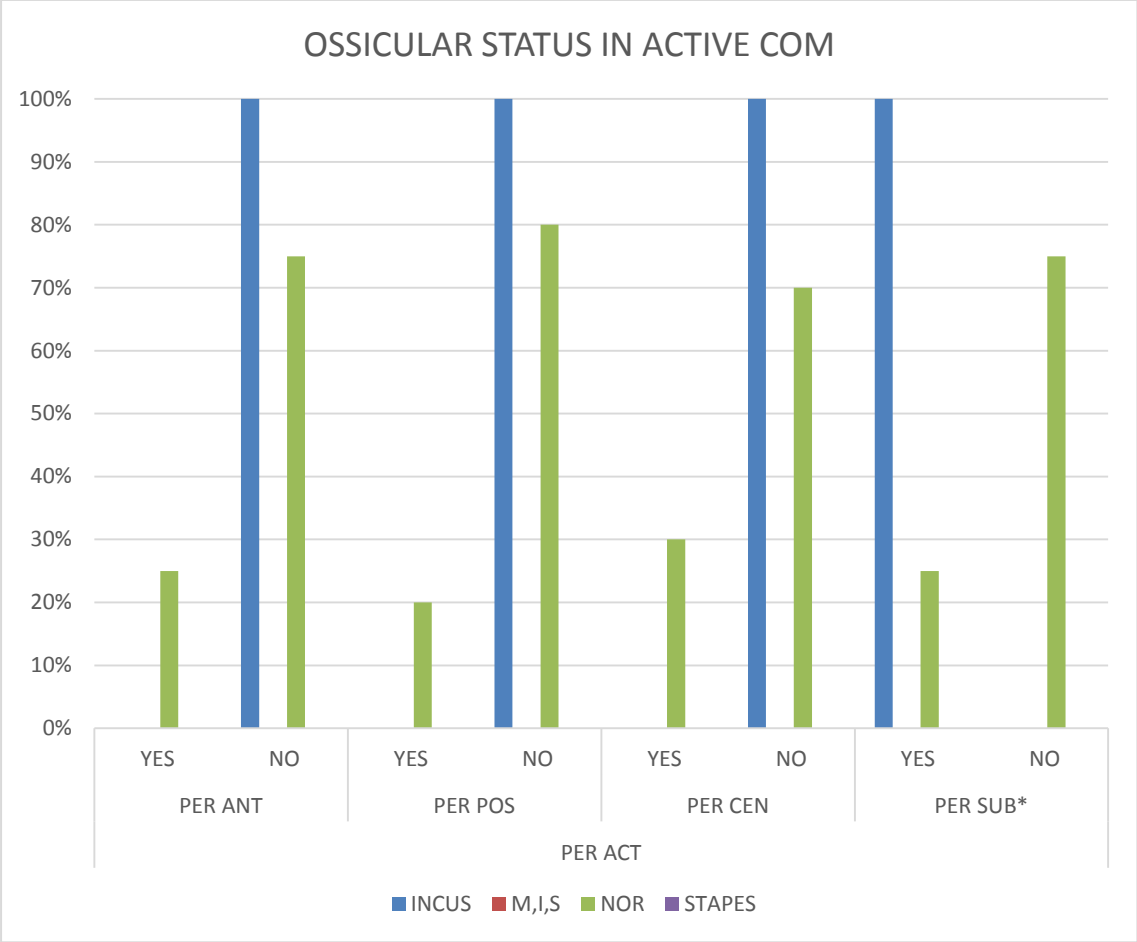
*** Indicats the significnce level at the point p<0.001 ** Indicats the significnce level at the point p<0.05**

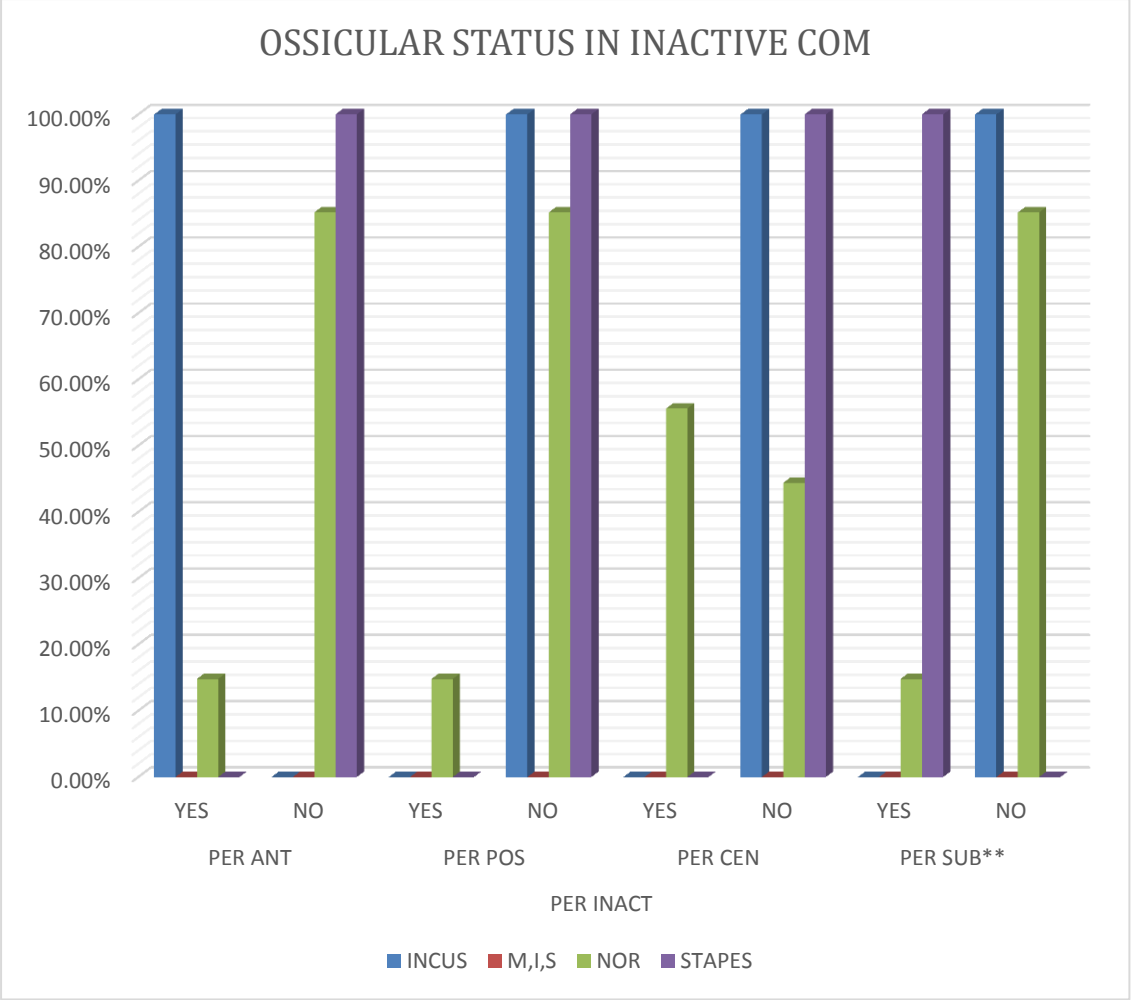
OSSICULAR STATUS IN RETRACTED TM

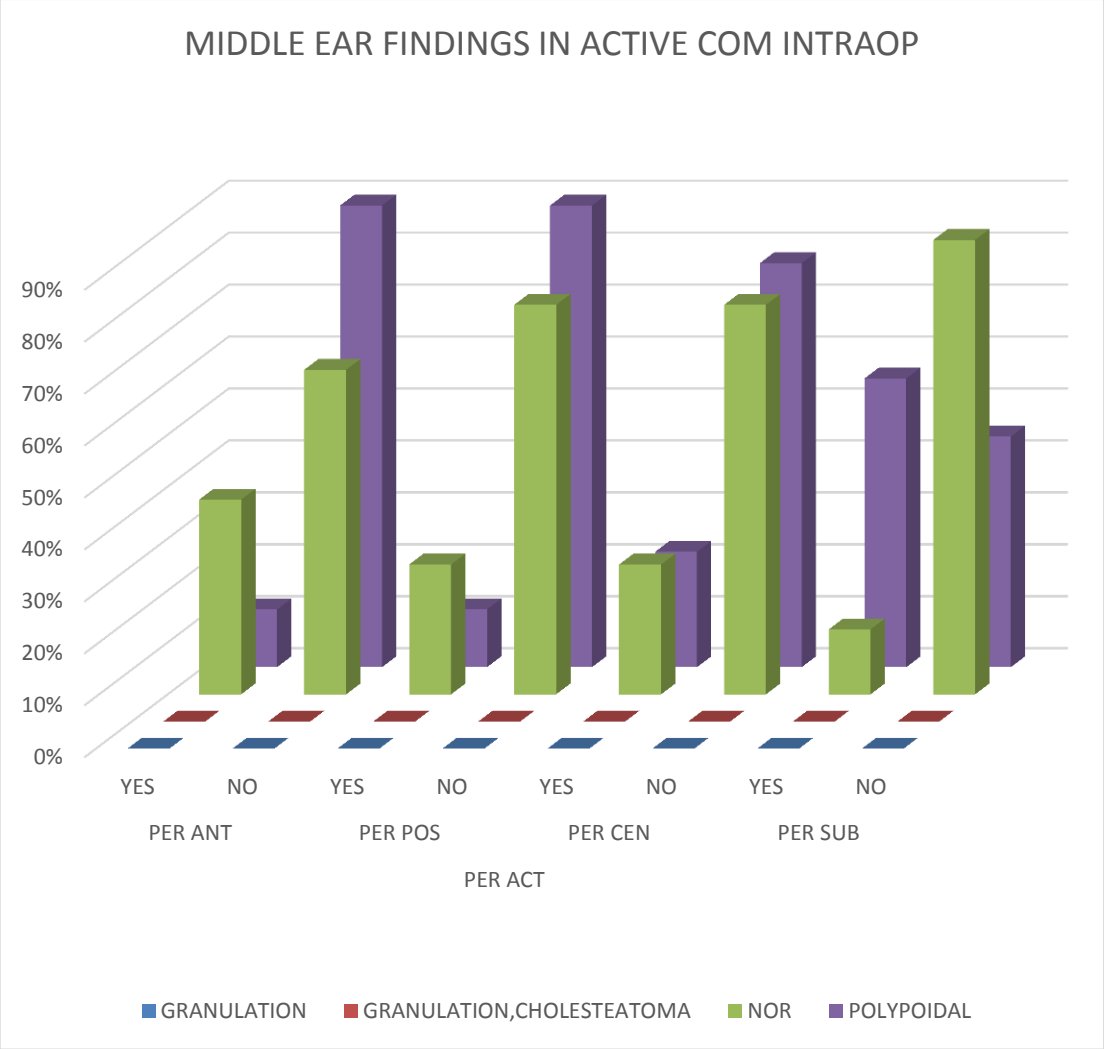
RETRACTED			OSSICLES							
			INCUS		M,I,S		NOR		STAPES	p Value
			n	n%	n	n%	N	n%	n	n%	
	ADHESIVE	YES	5.00	63%	0.00	0%	15.00	94%	0.00	0%	0.024
		NO	3.00	38%	1.00	100%	1.00	6%	0.00	0%	
	ATTIC	YES	1.00	13%	1.00	100%	0.00	0%	0.00	0%	0.001
		NO	7.00	88%	0.00	0%	16.00	100%	0.00	0%	
	PS	YES	2.00	25%	0.00	0%	1.00	6%	0.00	0%	0.383
		NO	6.00	75%	1.00	100%	15.00	94%	0.00	0%	
			MID EAR							
			GRANULATION		GRANULATION,CHOLESTEATOMA		NOR		POLYPOIDAL		
			n	n%	n	n%	N	n%	n	n%	
	ADHESIVE	YES	0.00	0%	0.00	0.00	20.00	100%	0.00	0%	0.001
		NO	1.00	100%	2.00	1.00	0.00	0%	2.00	100%	
	ATTIC	YES	1.00	100%	1.00	0.50	0.00	0%	0.00	0%	<0.001
		NO	0.00	0%	1.00	0.50	20.00	100%	2.00	100%	
	PS	YES	0.00	0%	1.00	0.50	0.00	0%	2.00	100%	<0.001
		NO	1.00	100%	1.00	0.50	20.00	100%	0.00	0%	

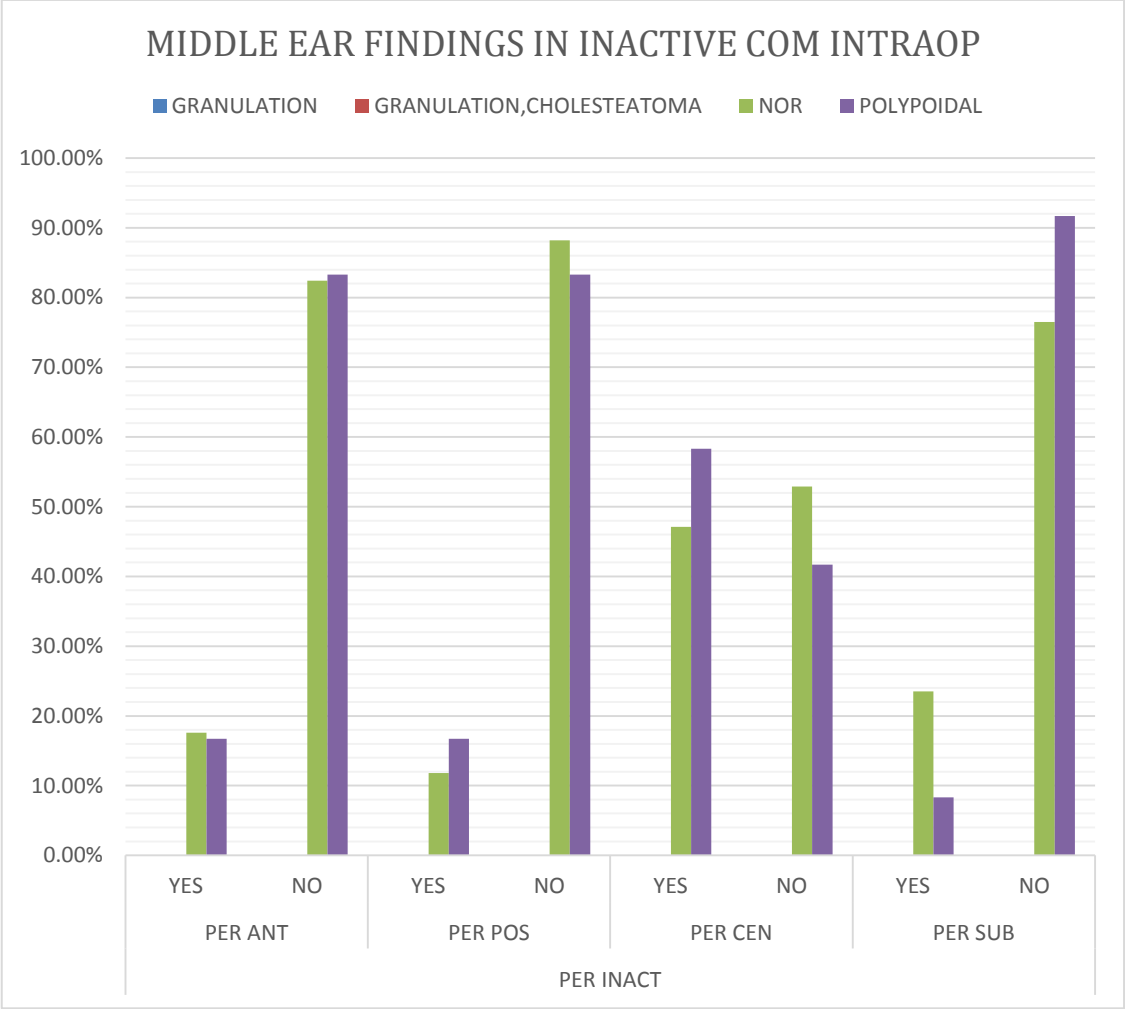
HEARING LEVEL & DURATION IN RETRACTED TM

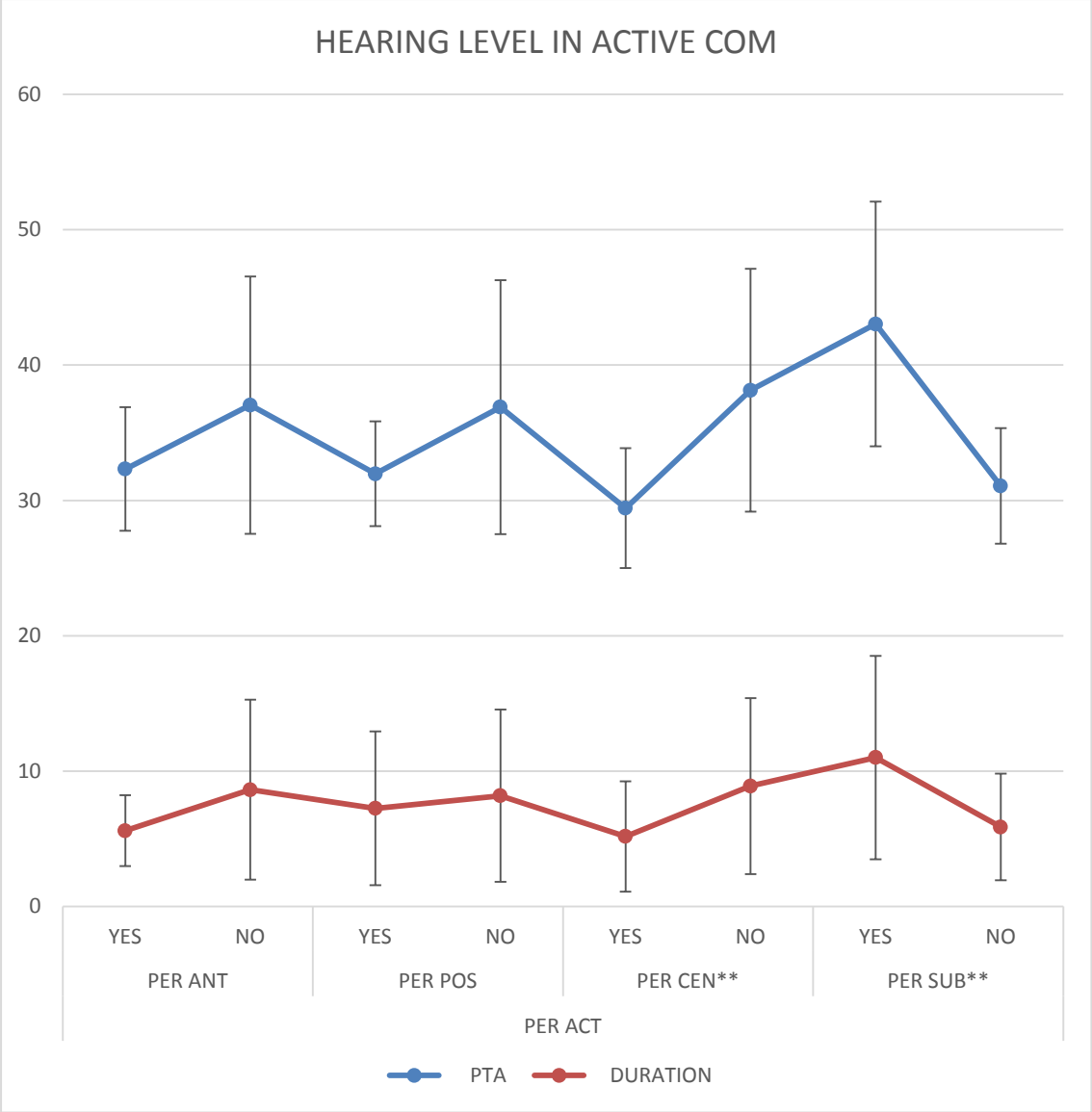
			PTA					DURATION		
			Mean	Standard Deviation	p Value		Mean		Standard Deviation	p Value
RETRACTED	ADHESIVE	1.00	39.35	9.99	0.759	ADHESIVE	2.62	1.00	2.95	0.459
		2.00	37.65	14.85			1.60	2.00	1.08	
	ATTIC	1.00	52.50	3.54	0.063	ATTIC	1.75	1.00	1.77	0.722
		2.00	37.84	10.40			2.48	2.00	2.78	
	PS	1.00	27.74	8.20	0.51	PS	1.50	1.00	.87	0.540
		2.00	40.55	10.29			2.55	2.00	2.84	

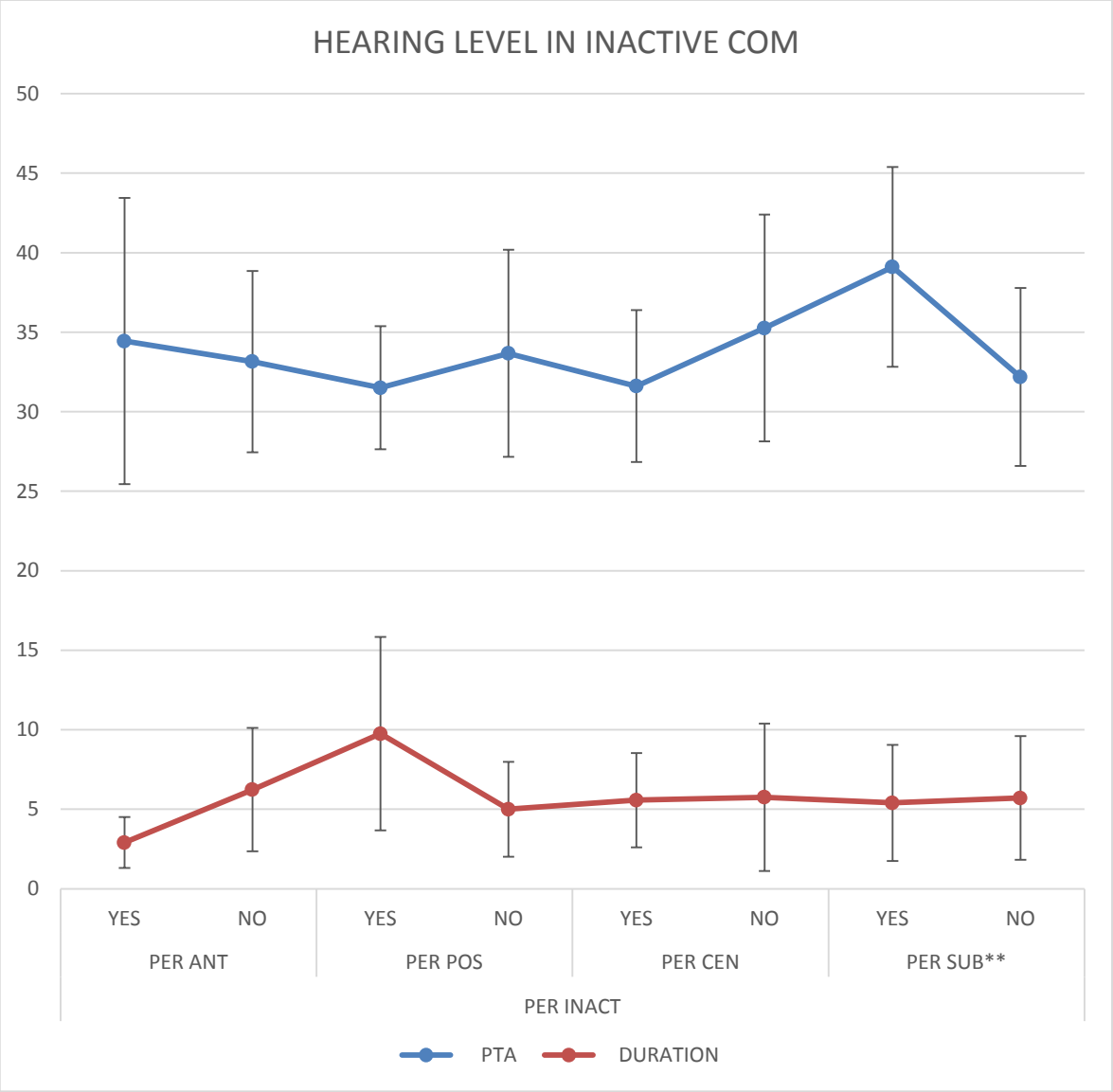

OSSICULAR STATUS IN ACTIVE COM
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
YES
NO
YES
NO
YES
NO
YES
NO
PER ANT
PER POS
PER CEN
PER SUB*
PER ACT
INCUS
M,I,S
NOR
STAPES

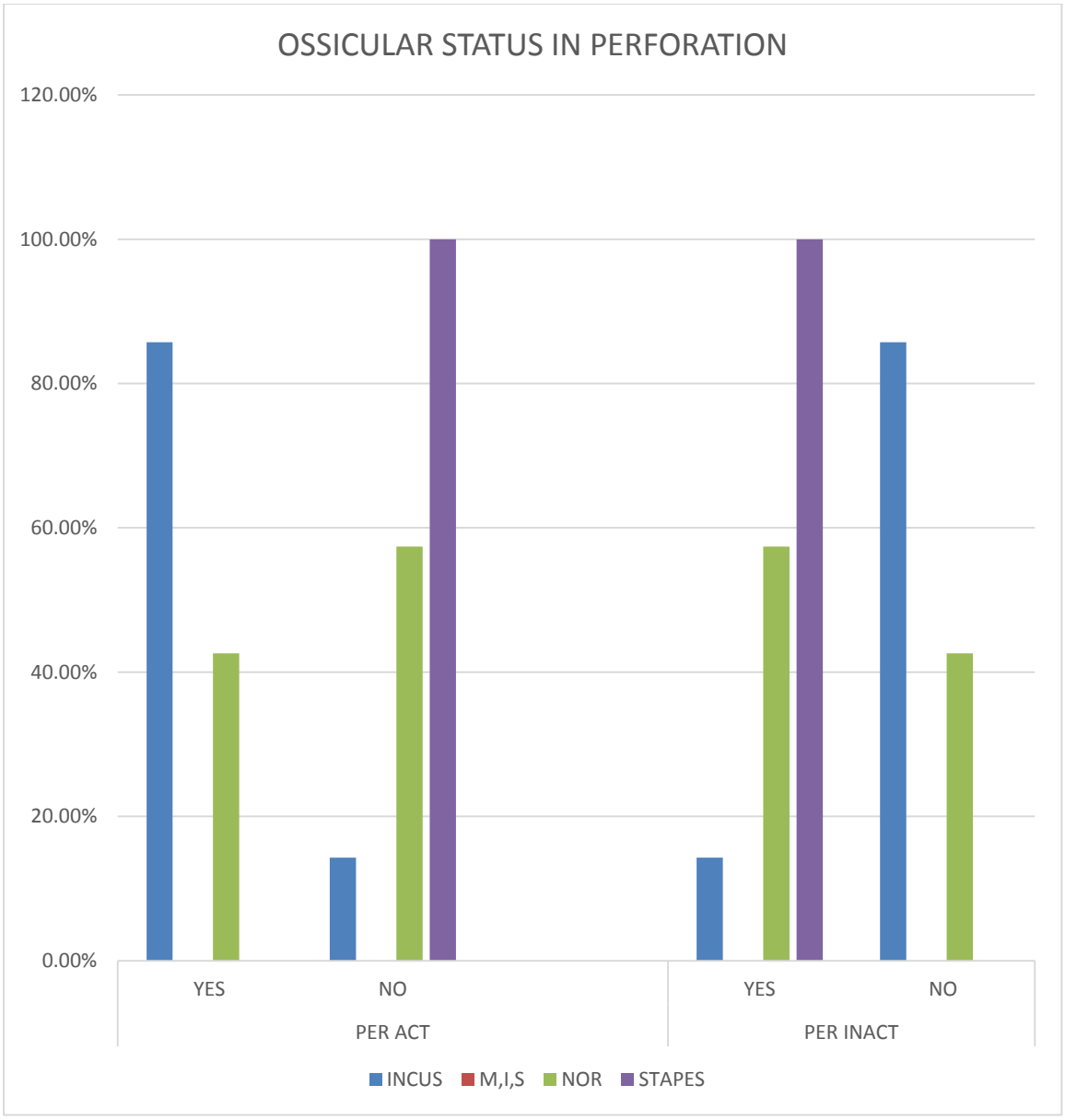

OSSICULAR STATUS IN INACTIVE COM
100.00%
90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
YES
NO
YES
NO
YES
NO
YES
NO
PER ANT
PER POS
PER CEN
PER SUB**
PER INACT
INCUS
M,I,S
NOR
STAPES

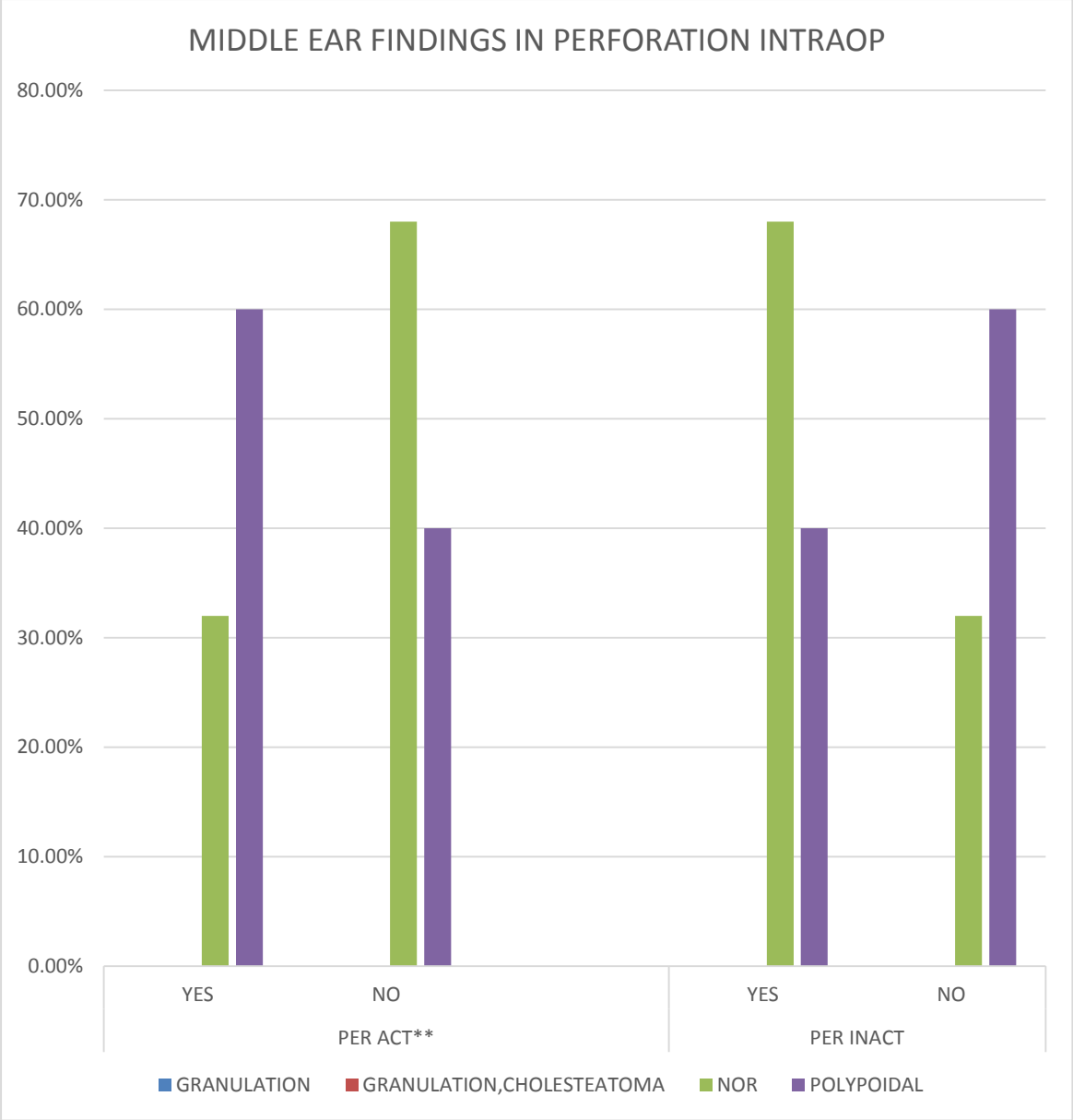

MIDDLE EAR FINDINGS IN ACTIVE COM INTRAOP
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
YES
NO
YES
NO
YES
NO
YES
NO
PER ANT
PER POS
PER CEN
PER SUB
PER ACT
GRANULATION
GRANULATION,CHOLESTEATOMA
NOR
POLYPOIDAL

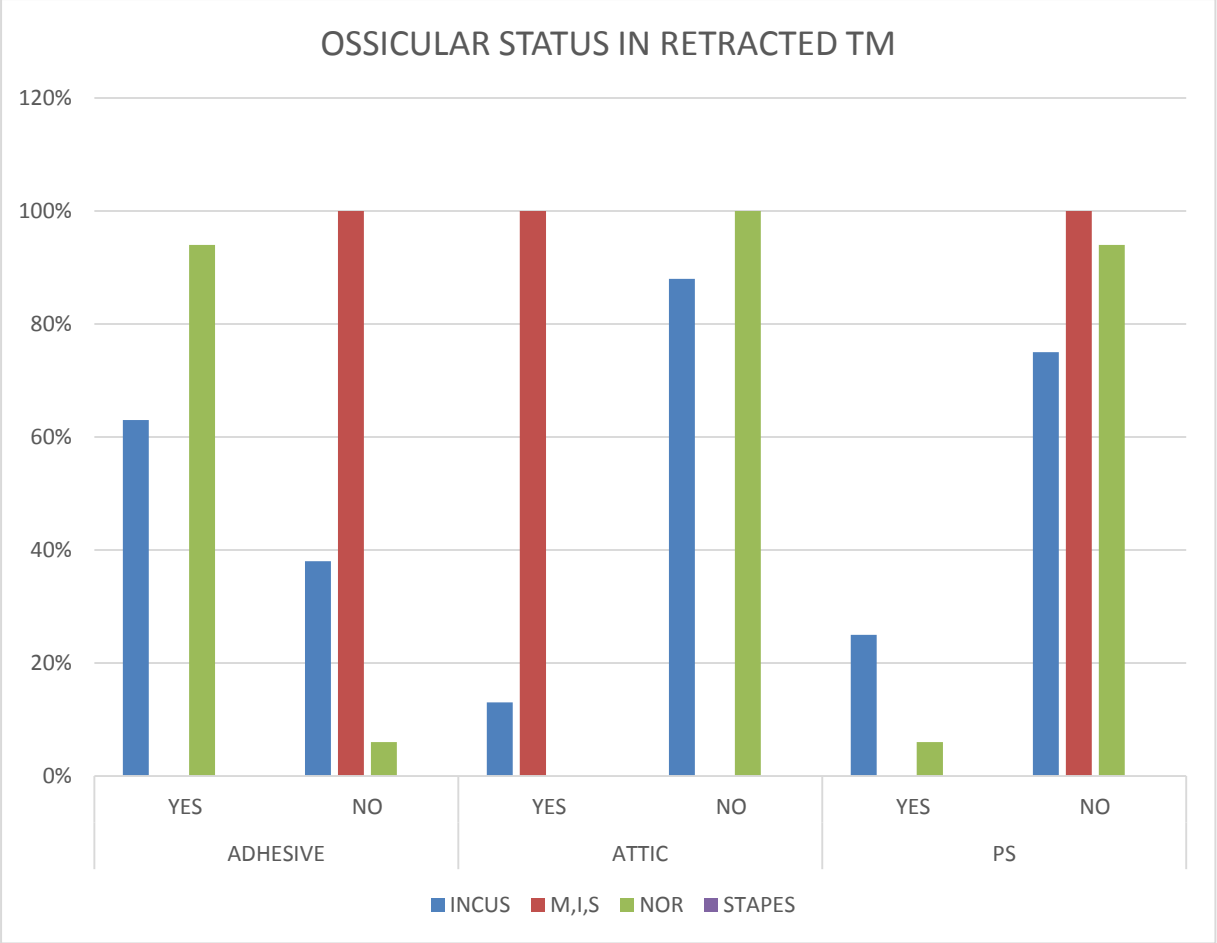

MIDDLE EAR FINDINGS IN INACTIVE COM INTRAOP
GRANULATION
GRANULATION,CHOLESTEATOMA
NOR
POLYPOIDAL
100.00%
90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
YES
NO
YES
NO
YES
NO
YES
NO
PER ANT
PER POS
PER CEN
PER SUB
PER INACT

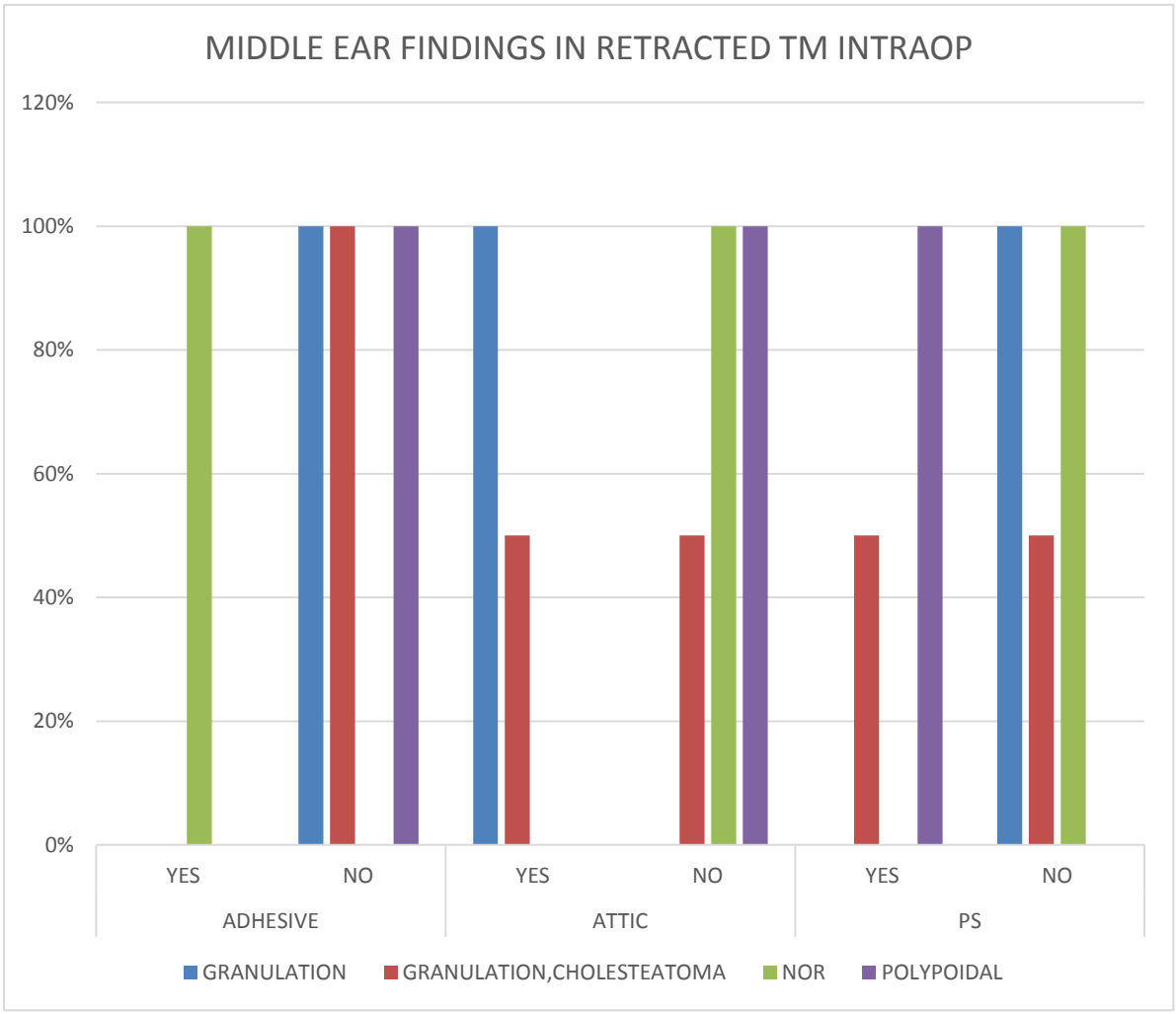

HEARING LEVEL IN ACTIVE COM
60
50
40
30
20
10
0
YES
NO
YES
NO
YES
NO
YES
NO
PER ANT
PER POS
PER CEN**
PER SUB**
PER ACT
PTA
DURATION

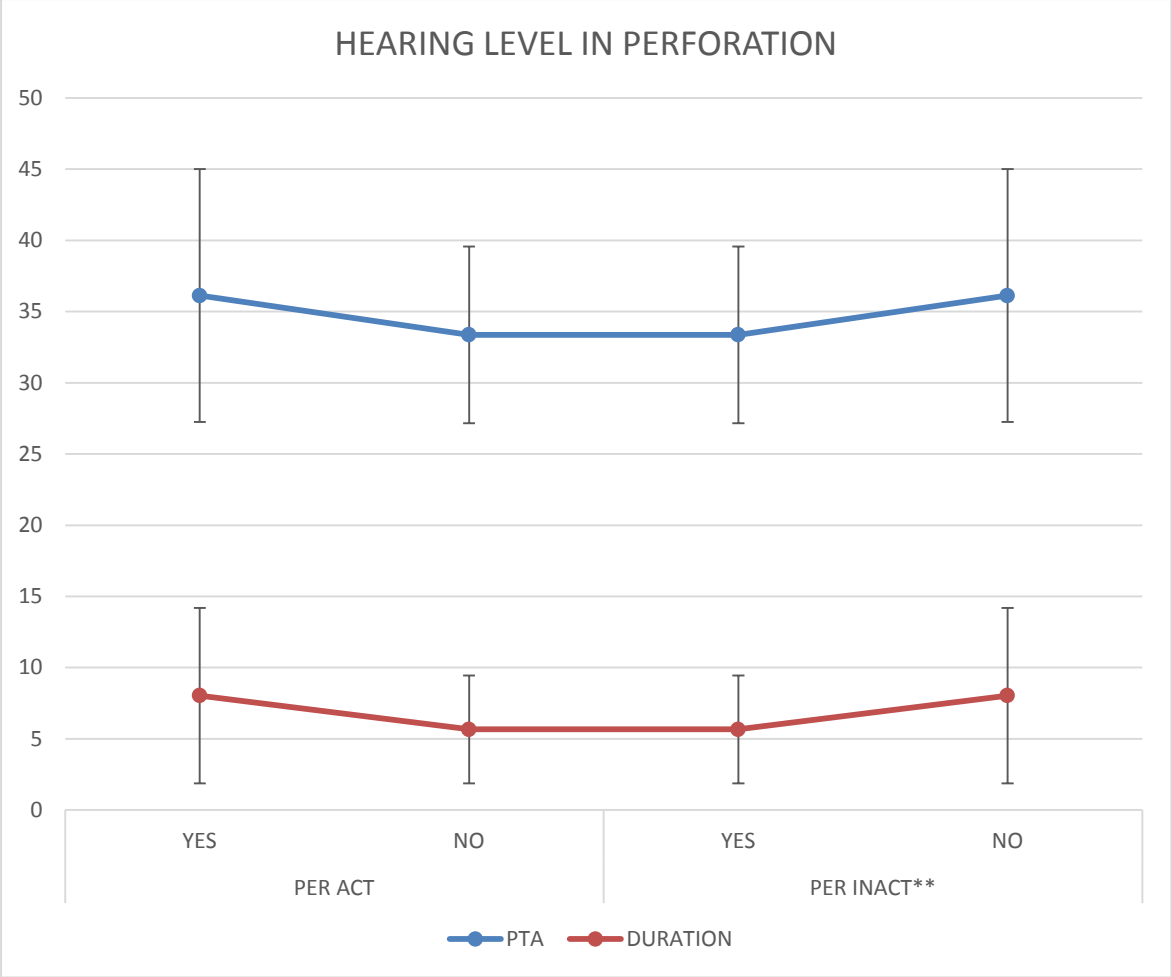

HEARING LEVEL IN INACTIVE COM
50
45
40
35
30
25
20
15
10
5
0
YES
NO
YES
NO
YES
NO
YES
NO
PER ANT
PER POS
PER CEN
PER SUB**
PER INACT
PTA
DURATION

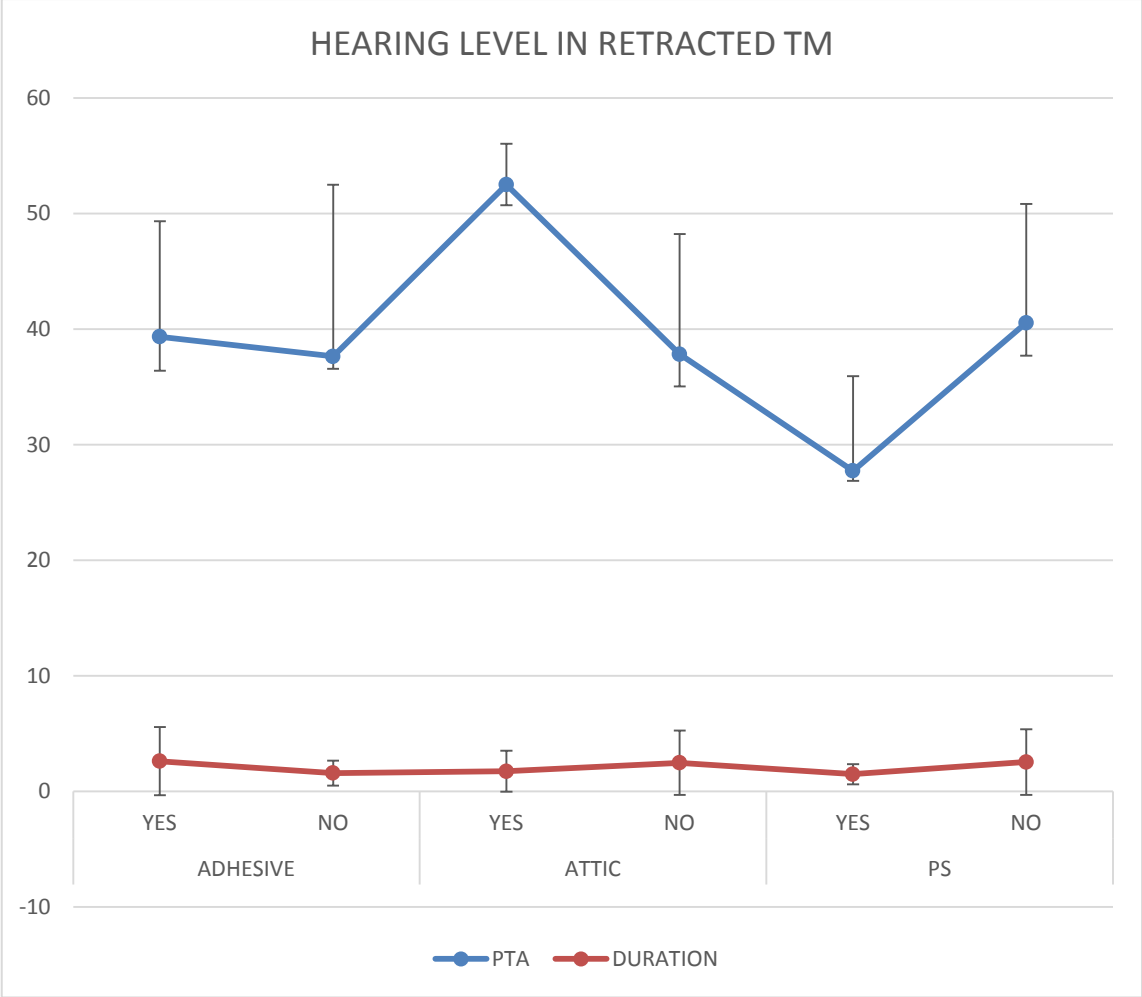

OSSICULAR STATUS IN PERFORATION
120.00%
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
YES
NO
YES
NO
PER ACT
PER INACT
INCUS
M,I,S
NOR
STAPES

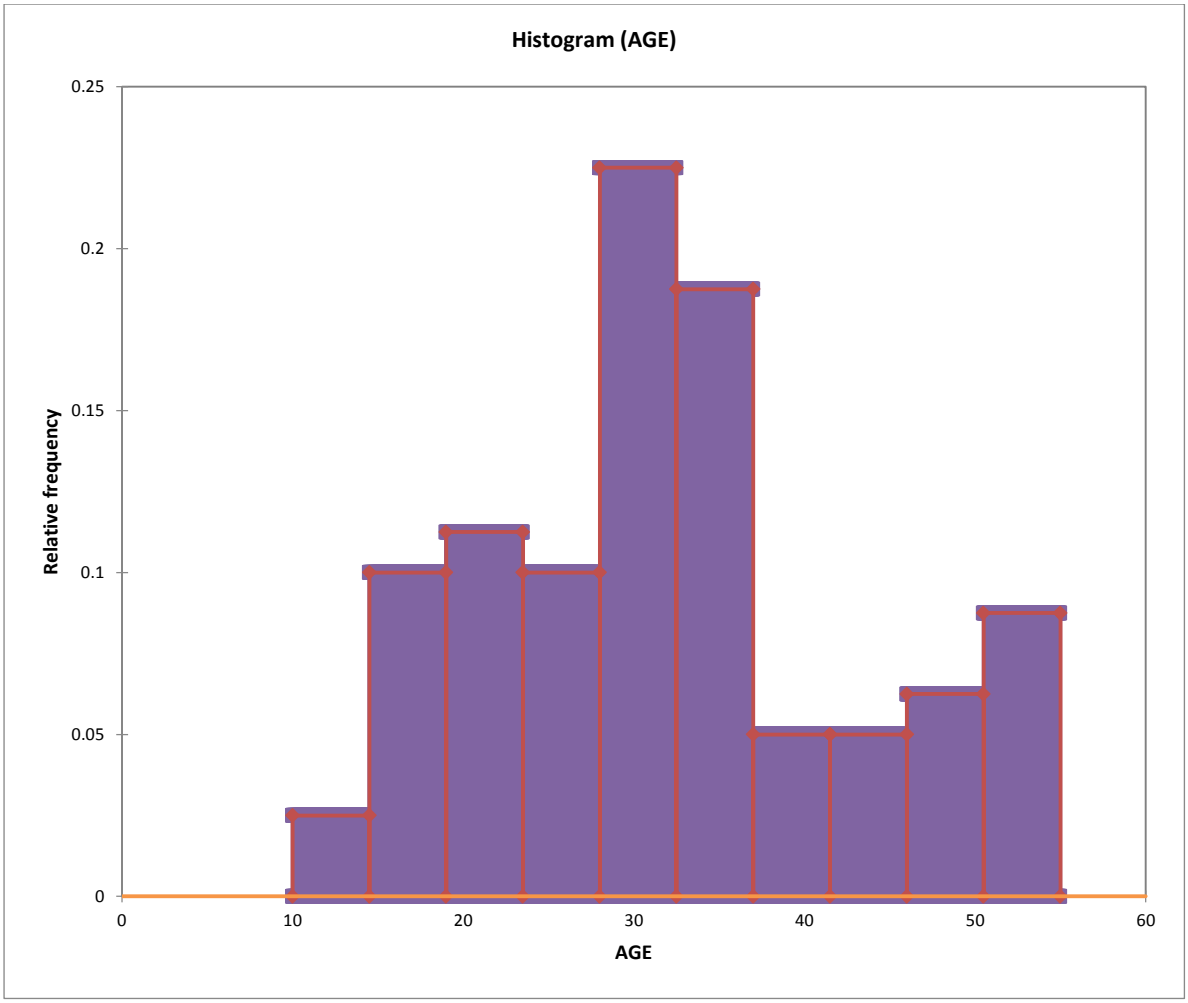

MIDDLE EAR FINDINGS IN PERFORATION INTRAOP
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
YES
NO
YES
NO
PER ACT**
PER INACT
GRANULATION
GRANULATION,CHOLESTEATOMA
NOR
POLYPOIDAL

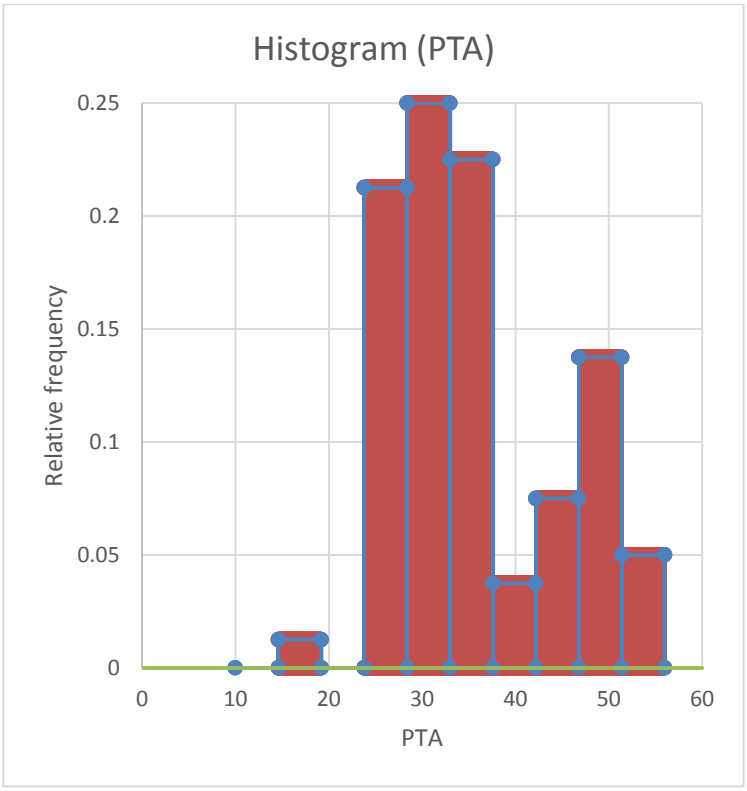

OSSICULAR STATUS IN RETRACTED TM
120%
100%
80%
60%
40%
20%
0%
YES
NO
YES
NO
YES
NO
ADHESIVE
ATTIC
PS
INCUS
M,I,S
NOR
STAPES

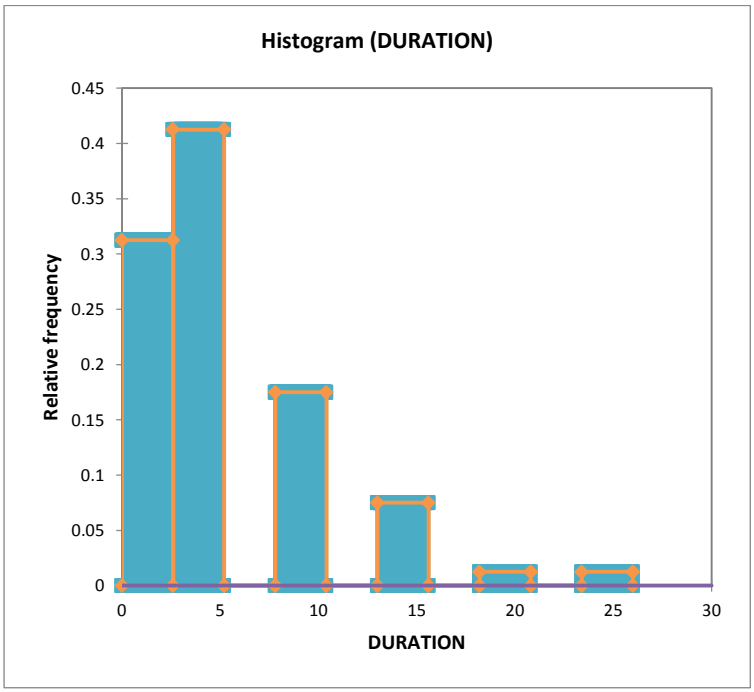

MIDDLE EAR FINDINGS IN RETRACTED TM INTRAOP
120%
100%
80%
60%
40%
20%
0%
YES
NO
YES
NO
YES
NO
ADHESIVE
ATTIC
PS
GRANULATION
GRANULATION,CHOLESTEATOMA
NOR
POLYPOIDAL


HEARING LEVEL IN PERFORATION
50
45
40
35
30
25
20
15
10
5
0
YES
NO
YES
NO
PER ACT
PER INACT**
PTA
DURATION


HEARING LEVEL IN RETRACTED TM
60
50
40
30
20
10
0
-10
YES
NO
YES
NO
YES
NO
ADHESIVE
ATTIC
PS
PTA
DURATION

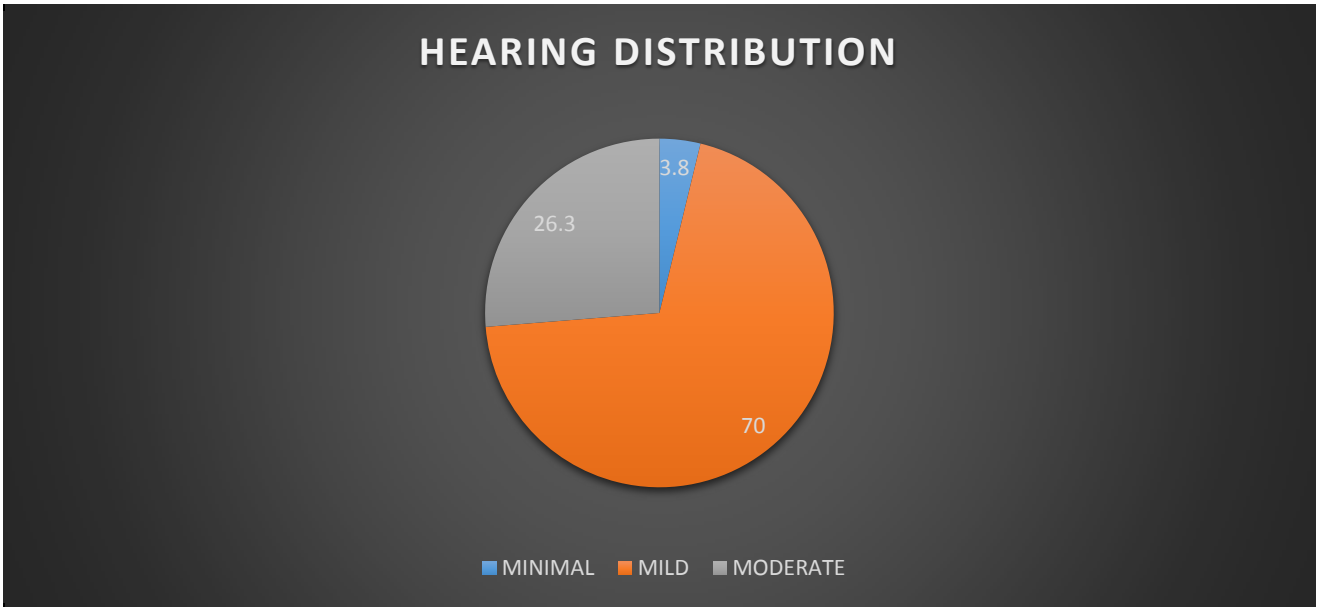

Histogram (AGE)
0.25
0.2
0.15
0.1
0.05
0
Relative frequency
0
10
20
30
40
50
60
AGE


Histogram (PTA)
Relative frequency
0.25
0.2
0.15
0.1
0.05
0
0
10
20
30
40
50
60
PTA


Histogram (DURATION)
Relative frequency
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0
5
10
15
20
25
30
DURATION

PTA CLASS

	Frequency	Percent	Valid Percent	Cumulative Percent
MINIMAL	3	3.8	3.8	3.8
MILD	56	70.0	70.0	73.8
MODERATE	21	26.3	26.3	100.0
Total	80	100.0	100.0	



	Mean	Standard Deviation	Minimum	Maximum
AGE	32.00	10.63	14.00	54.00
PTA	36.03	8.91	18.33	55.00
DURATION	5.42	4.94	.50	25.00

		n	n%
GENDER	F	52	65.0%
	M	28	35.0%
LATERALITY	BL	44	55.0%
	UL	36	45.0%
PER TM	NO	25	31.3%
	YES	55	68.8%
RETRACTED	NO	55	68.8%
	YES	25	31.3%
PER ANT	NO	70	87.5%
	YES	10	12.5%
PER POS	NO	72	90.0%
	YES	8	10.0%
PER CEN	NO	59	73.8%
	YES	21	26.3%
PER SUB	NO	64	80.0%
	YES	16	20.0%
PER ACT	NO	54	67.5%
	YES	26	32.5%
PER INACT	NO	51	63.8%
	YES	29	36.3%
ADHESIVE OM	NO	60	75.0%
	YES	20	25.0%
ATTIC	NO	78	97.5%
	YES	2	2.5%
PS	NO	77	96.3%
	YES	3	3.8%
IMPEDANCE	A	15	18.8%
	AD	4	5.0%
	AS	1	1.3%
	B	60	75.0%
OSSICLES	INCUS	15	18.8%
	M,I,S	1	1.3%
	NOR	63	78.8%
	STAPES	1	1.3%
MID EAR	GRANULATION	1	1.3%
	GRANULATION,CHOLESTEATOMA	2	2.5%
	NOR	45	56.3%
	POLYPOIDAL	32	40.0%
COMPLAINTS	DISCHARGE	53	66.3%
	HOH	27	33.8%

Review of Literature

Devashri uday patil et all conducted study which involved 100 patients. In that , central perforation seen in 46.4%, anterior central perforation seen in 8.7%, posterior central perforation seen in 20.2%, subtotal perforation seen in 24.63% cases. Maximum number of patients included in the study were between 21-30 years with a male & female rartio of 1:1.77. Out of 100 patients, 31 patients had unsafe CSOM. 77.4% patients had granulations. 87.1% patents had ossicular defects. In safe type (69 patients), no one had ossicular chain defects. In their study hearing loss was more in subtotal perforation than posterior central perforation.

Shaheen malik et all observed that posteriorly placed perforation had greater degree of hearing loss compared to other sites.

Mohammed Shafiqul Islam et all observed the same in the study.

Devashri Uday Patil et all observed that majority of the patients had mild hearing loss of 47.8%, moderate hearing loss was seen in 31.9% of patients and moderately severe hearing loss was seen in 20.3% of patients.

Fuh cherng jenny et all in his study,out of 250 patients, 17 patients had ossicular discontinuity in safe type of CSOM.

Roberto Albera et all did study in 250 patients in which 10% of patients had OCS. 7% of patients with TP(Inactive disease), and 19% of patients with NCOM(Active disease).

In that , 4% of subtotal perforation and 30% of central perforation and 62% of posterior perforation. Malleus resorption seen in 15% of patients, Incus involvement seen in 92% of patients, stapes involvement seen in 27% of patients. 15% of patients had all three ossicles affected. OCS occurs more common in B/L than U/L.

Manas Ranjan Rout et all, in his study (n=200)63% had normal ossicular chain and 37% of patients had some ossicular defects. Ossicular involvement was found more commonly in patients with subtotal perforations in comparison to central perforations. Out of 74 patients with OCS, 56 patients had subtotal perforation and 18 patients had central perforation. Commonest ossicle involved was found to be the long process of incus.

S.Gurumani et all in his study showed that incus was most commonly affected ossicle and was most commonly seen in patients with subtotal perforation of tympanic membrane.

Vidyashree Nahata et all in his study (n=100) observed that a common age group of 15-24 years, which was similar to the studies of shyamala and reddy and agarwal et all. Male:Female ratio was 3:4. B/L involvement was more common.

Otorrohoea was the most common presenting complaint. Hearing loss ranged from 23.3db to 45 db. Hearing loss was more in posterior perforation followed by central perforation.

DISCUSSION

The present study was conducted from Nov 2014 to Aug 2016. Totally 80 patients were involved in this study. The mean age was 32 years which was differed from Devashri uday patil et all study(21-30 yrs), & udaaipurwale IH et all study. Biteral disease(55%) was found to be more common than Unilatral(45%) disease which was similar to Roberto Albera et all & vijayshree nahota et all study. Out of 80 patients , 53 patients had complaints of ear discharge (66.3%) compared to 27 patients(33.8%) who had complaints of hard of hearing as their primary complaint. The mean duration of complaint was 5.42 years. Female were more commonly affected than males(1.85:1). Out of 80 patients , 55 patients (68.8%) had tympanic membrane perforation, 25 patients(31.3%) had retracted TM. In that attic retractions were found in 2 patients(2.5%) and PSRP found in 3 patients(3.8%), Adhesive otitis media found in 20 patients(25%). Among TM perforation group, 26 patients (32.5%) had Active COM, 29 patients (36.3%) had Inactive COM the results are similar to Roberto Albera et all study in which Inactive disease was more common(74%). In patients with perforated TM(55=n), 10 patients (12.5%) had anterior perforation ,8 patients (10%) had posterior perforation , 21 patients (26.3%) had central perforation, 16 patients (20%) had subtotal perforation. In our study , central perforation was more common which was similar (46.4%) to Devashri uday patil et all study.

Compared to Roberto Albera et all study which had subtotal perforation to be more common. Mean hearing loss was 36.03db with standard deviation of 8.91db with a minimum of 18.33db and maximum of 55db hearing loss found in our study.

Average hearing loss in perforation TM was found to be 34.75 db which correlates to shambaugh et all who said perforation of TM causes negligible to 50 db hearing loss. The mean hearing loss in anterior perforation was 33.38 db. In posterior perforation was 31.73 db. In central perforation was 30.52db.In subtotal perforation was 41.06 db. But in subtotal perforation the minimum hearing loss was found to be 31db and maximum of 55db, and p value was <0.05 which was statistically significant. According to shambaugh et all maximum hearing loss was 50db in perforated TM. But in our study ,maximum hearing loss was found to be 55db which indicates some ossicular involvement in that patient.

A patient presents with complaint of hearing loss with TM perforation and an audiometric values of more than 50 db , it is an indication of ossicular chain involvement preoperatively. It can be taken as a pre-op indicator for ossicular chain involvement in a patient with safe type of CSOM. In our study, patients who had subtotal perforation had more hearing loss (41.06db) than others, which was similar to Devashri uday patil et all study. Patients in Active COM group had more hearing loss(36.13 db) than Inactive disease group (33.37db) which was statistically significant($p<0.05$). Compared to any other group, patients with active COM with subtotal perforation had more hearing loss(43.03db), which was statistically significant($p<0.05$).

Patients with retracted TM had 39.86db hearing loss. Adhesive otitis media group had 39.35db hearing loss. Patients with posterosuperior retraction had 27.74 db hearing loss. Patients with Attic retraction had 52.50db hearing loss.

Patients in perforation group underwent Cortical mastoidectorny and tympanoplasty and in retracted group underwent Atticotomy , Functional Endoscopic Ear Surgery and Cartilage Tympanoplasty.

In perforated Tympanic membrane group, out of 55 patients, 8 patients(10%) had ossicular involvement which differed from devashree uday patil et all study in which all patients were found to be intact . But our study showed similar results of gurumani et all study which showed ossicular involvement more commonly seen in subtotal perforation. In subtotal perforation out of 16 patients, 7 patients (43%) had ossicular involvement.

In Roberto albera et all study OCS was more commonly seen in patients with Active disease(19%) than Inactive disease(7%). In his study he found 10% of patients who had perforated TM suffered OCS. In our study patients with Active COM had (8.75%) OCS which was more than Inactive disease(1.25%). Most commonly involved ossicle was incus which was similar to Roberto Albera et all & Gurumani et all study.9 out of 25 patients(36%) had ossiculer invlolvement in our study in patients with Retracted TM compared to other group. In that 5 out of 20 patients had ossicular involvement in patients with Adhesive otitis media. Incus was the most common ossicle affected here.

Overall in 80 patients , 17 patients had ossicular (21.25%) involvement. Considering intra operative findings, out of 55 patients with perforated TM, 30 pts(54.54%) had polypoidal middle ear mucosa . In Active group, out of 26 patients ,18 patients (69.23%) had

polypoidal middle ear mucosa. In Inactive group, out of 29 patients, 12 patients(41.37%) had polypoidal middle ear mucosa .

Chronic active otitis media Group had more polypoidal middle ear mucosa (69.23%) than Chronic inactive otitis media group (41.37%) which was statistically significant.

In retracted TM group, out of 25 patients, 2 patients had cholesteatoma and granulation tissue, 1 patient had polypoidal mucosa , 1 patient had granulation tissue alone as their intra operative findings. In posterosuperior retraction, out of 3 patients 2 patients had cholesteatoma in middle ear and another one patient had normal middle ear findings.2 Patients had short process of incus erosion . Another one patient had intact ossicles. Functional Endoscopic Ear Surgery was done in first 2 patients. Cartilage Tympanoplasty done in another patient. First 2 patients had grade 4 retractions and the retractions extended beyond subclinical view. In Attic retraction, out of 2 patients 1 patient had cholesteatoma in the middle ear. Another one had granulation tissue in the middle ear. One patient had short process of incus, handle of malleus and stapes suprastructure erosion and the other had long process of incus erosion. Functional endoscopic ear surgery was done in both patients. According to shambaugh et all once the retractions extends beyond the subclinical view ,it can be the indication for surgery. Retraction

will cause a subclinical inflammatory state which can evolve in the epithelial tissue, resulting in adhesions between the tympanic membrane to the ossicles, promontory mucosa, or medial aspect of the scutum which leads to ossicular involvement and cholesteatoma formation. So in this group the clinical findings and audiological evaluation doesn't correlate with intraoperative findings. They had more disease in the middle ear. And these kind of patients should be evaluated more carefully and pre operative HRCT temporal bone will provide a better picture about the extent of the disease.

Duration of the complaints plays important role in hearing level of the patients and ossicular involvement. Patients with Active COM had mean duration of complaints of 8.04 years and they had 36.13DB as their mean hearing loss which was statistically significant ($p < 0.05$) compared to other groups. In Active COM group ,patients with subtotal perforation had 11 years of mean duration of complaint and 43.03DB of mean hearing loss which was also statistically significant. But in Retracted TM group the differences are not statistically significant.

In our study most of patients had mild conductive hearing loss (n=56)(70%) followed by moderate conductive hearing loss (n=21)(26.3%). 3 patients had minimal conductive hearing loss(3.8%).

CONCLUSION

Most common cause of conductive hearing loss in our study was chronic suppurative otitis media. Most of the patients had central perforation followed by subtotal perforation. In perforated group, hearing loss was more in Chronic active otitis media with subtotal perforation and these group of patients had more ossicular involvement. It shows patients presents with chronic active otits media with subtotal perforation will have high chance of ossicular involvement compared to chronic inactive otitis media due to these group of patients have more inflammation in middle ear and mastoid & more inflammatory infiltrates. Retracted group of patients should be evaluated more carefully ,because their audiological findings and clinical findings doesn't correlate with intraoperative findings. Overall, patients with Active COM with subtotal perforation had more hearing loss and more ossicular involvement because of their active disease process and duration of complaints. Most of the patients had mild CHL (26-40 DB)(70%). We can assess the patient with conductive hearing loss preoperatively by using the clinical findings & audiological methods which mostly correllates with peroperative findings.

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PROFORMA

CASE NUMBER :

NAME :

AGE / SEX :

IP NO. :

DATE OF ADMISSION :

DATE OF DISCHARGE:

OCCUPATION :

INCOME :

ADDRESS :

COMPLAINTS OF :

1. EAR DISCHARGE
2. HARD OF HEARING
3. EAR PAIN
4. RINGING SENSATION
5. FEVER
6. VERTIGO
7. HISTORY OF TRAUMA
8. SYMPTOMS OF INTRACRANIAL COMPLICATIONS
    a. HEADACHE
    b. VOMITING
    c. SEIZURE

PAST HISTORY

HISTORY OF PREVIOUS EAR SURGERY

FAMILY HISTORY

PERSONAL HISTORY

EXAMINATION

EAR

PREAURICULAR REGION

PINNA

POST AURICULAR REGION

EXTERNAL AUDITORY CANAL

TYMPANIC MEMBRANE

MASTOID TENDERNESS

THREE FINGER TEST

FACIAL NERVE

TUNING FORK TEST

RINNE

WEBER

ABSOLUTE BONE CONDUCTION TEST

FISTULA TEST

VESTIBULAR SYSTEM

NOSE

THROAT

DIAGNOSIS

PLAN

INVESTIGATIONS

COMPLETE HEMOGRAM

RENAL FUNCTION TESTS

CHEST X RAY

SEROLOGICAL TESTS

ECG

EXAMINATION ON TABLE FINDINGS

PURE TONE AUDIOGRAM

X RAY MASTOIDS – LATERAL OBLIQUE VIEW.

NAME	AGE	GENDER	LATERALITY	PER TM	PER ANT	PER POS	PER CEN	PER SUB	PER ACT	PER INACT	RETRACTED	ADOM	ATTIC	PS	PTA	IMPEDANCE	OSSICLES	MID EAR	COMPL	DURATION
AMMU	30	F	UL	YES	NO	NO	NO	YES	NO	YES	NO	NO	NO	NO	33	B	NOR	N	D	10
CHITRA	26	F	UL	YES	NO	NO	YES	NO	NO	YES	NO	NO	NO	NO	28	B	NOR	N	D	5
KALPANA DEVI	27	F	UL	YES	NO	NO	NO	YES	YES	NO	NO	NO	NO	NO	55	B	INCUS	POL	D	5
GAYATHRI	20	F	UL	YES	NO	NO	YES	NO	YES	NO	NO	NO	NO	NO	28	B	NOR	N	D	5
RAMZAN BEGAM	18	F	BL	YES	NO	NO	NO	YES	NO	YES	NO	NO	NO	NO	35	B	NOR	N	D	8
SANGEETHA	19	F	UL	YES	YES	NO	NO	NO	YES	NO	NO	NO	NO	NO	32	B	NOR	N	D	5
JEGAN	34	M	UL	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	YES	32	B	INCUS	POL	HOH	2
LAKSHMI NARAYANAN	51	M	UL	YES	NO	NO	YES	NO	NO	YES	NO	NO	NO	NO	37	B	NOR	POL	D	5
DHANALAKSHMI	25	F	UL	YES	YES	NO	NO	NO	NO	YES	NO	NO	NO	NO	37	B	NOR	N	D	4
SHANTHI	52	F	BL	YES	NO	NO	NO	YES	NO	YES	NO	NO	NO	NO	47	B	NOR	N	D	5
RAMKUMAR	14	M	BL	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	YES	33	B	INCUS	GR,CL	HOH	2
PANDIYAN	37	M	BL	NO	NO	NO	NO	NO	NO	NO	YES	NO	YES	NO	55	B	M,I,S	GR,CL	HOH	3
PREMA	36	F	BL	YES	YES	NO	NO	NO	NO	YES	NO	NO	NO	NO	48	B	INCUS	POL	D	4
NAVEEN	22	M	BL	YES	NO	NO	YES	NO	NO	YES	NO	NO	NO	NO	27	B	NOR	N	D	10
PONMARIAPPAN	32	M	UL	YES	NO	YES	NO	NO	NO	YES	NO	NO	NO	NO	26	B	NOR	POL	D	15
KURSHITH	15	M	UL	YES	NO	NO	YES	NO	NO	YES	NO	NO	NO	NO	45	B	NOR	POL	D	8
ARULJOTHI	23	F	UL	YES	NO	NO	YES	NO	NO	YES	NO	NO	NO	NO	29	B	NOR	POL	HOH	3
NOORJAHAN	36	F	UL	YES	NO	NO	NO	YES	YES	NO	NO	NO	NO	NO	32	B	NOR	POL	D	10
BHAVANI	18	F	UL	YES	NO	NO	YES	NO	NO	YES	NO	NO	NO	NO	27	B	NOR	POL	D	10
GANESH	18	M	BL	YES	YES	NO	NO	NO	YES	NO	NO	NO	NO	NO	40	B	NOR	POL	D	10
ARUNACHALAM	18	M	BL	YES	NO	NO	YES	NO	NO	YES	NO	NO	NO	NO	32	B	NOR	POL	D	3
SELVI	30	F	UL	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	YES	18	B	NOR	POL	D	0.5
CHANDRAKALA	20	F	BL	YES	NO	NO	YES	NO	NO	YES	NO	NO	NO	NO	28	B	NOR	N	D	8
SEETHA	20	F	UL	YES	NO	NO	YES	NO	NO	YES	NO	NO	NO	NO	30	B	NOR	POL	D	0.5
SONAGRACY	14	F	BL	YES	YES	NO	NO	NO	NO	YES	NO	NO	NO	NO	25	B	NOR	N	D	0.5
GANESH	17	M	BL	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	55	AS	INCUS	N	HOH	1
RANGANATHAN	54	M	BL	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	47	A	NOR	N	HOH	10

RAJESH	32	M	BL	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	40	A	NOR	N	HOH	5
RANGANATHAN	54	M	UL	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	45	A	NOR	N	HOH	10
VIDYASREE	27	F	BL	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	50	A	NOR	N	HOH	2
UMA MAHESHWARI	41	F	BL	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	51	AD	INCUS	N	HOH	2
ANBARASI	47	F	BL	NO	NO	NO	NO	NO	NO	NO	YES	NO	YES	NO	50	B	INCUS	GR	HOH	0.5
AYISHA	19	F	UL	YES	YES	NO	NO	NO	NO	YES	NO	NO	NO	NO	34	B	NOR	POL	D	2
SAHINABANU	36	F	BL	YES	NO	NO	YES	NO	NO	YES	NO	NO	NO	NO	33	B	NOR	N	D	4
SANGEETHA	24	F	UL	YES	NO	NO	NO	YES	NO	YES	NO	NO	NO	NO	36	B	NOR	N	HOH	1
KESAVAN	35	M	UL	YES	NO	YES	NO	NO	NO	YES	NO	NO	NO	NO	33	B	NOR	POL	D	15
SARIKA	17	F	BL	YES	NO	YES	NO	NO	YES	NO	NO	NO	NO	NO	26	B	NOR	POL	D	8
ARUNACHALAM	18	M	UL	YES	NO	NO	NO	YES	NO	YES	NO	NO	NO	NO	45	B	STAPES	POL	D	3
SELVI	42	F	BL	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	55	AD	INCUS	N	HOH	3
KAMESHWARA RAO	30	M	BL	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	35	A	NOR	N	HOH	0.5
HEMALATHA	32	F	BL	YES	NO	NO	NO	YES	YES	NO	NO	NO	NO	NO	50	B	NOR	POL	D	2
AMSAVALLI	46	F	UL	YES	NO	NO	YES	NO	YES	NO	NO	NO	NO	NO	25	B	NOR	POL	D	1
GOMATHI	28	F	BL	YES	NO	NO	YES	NO	NO	YES	NO	NO	NO	NO	35	B	NOR	POL	D	10
LALITHA	25	F	UL	YES	NO	NO	YES	NO	YES	NO	NO	NO	NO	NO	38	B	NOR	POL	D	1
VENKATALAKSHMI	36	F	UL	YES	YES	NO	NO	NO	NO	YES	NO	NO	NO	NO	28	B	NOR	N	HOH	4
CHOKKALINGAM	23	M	UL	YES	NO	NO	NO	YES	YES	NO	NO	NO	NO	NO	31	B	NOR	POL	D	4
KAVITHA	28	F	UL	YES	NO	YES	NO	NO	YES	NO	NO	NO	NO	NO	33	B	NOR	N	D	3
PARANTHAMAN	25	M	UL	YES	NO	NO	NO	YES	YES	NO	NO	NO	NO	NO	32	B	NOR	POL	D	5
RAMEELA	23	F	UL	YES	NO	NO	YES	NO	YES	NO	NO	NO	NO	NO	28	B	NOR	N	D	4
SANGAVI	35	F	UL	YES	NO	YES	NO	NO	YES	NO	NO	NO	NO	NO	33	B	NOR	POL	D	15
SELVI	32	F	BL	YES	YES	NO	NO	NO	YES	NO	NO	NO	NO	NO	28	B	NOR	N	D	5
BHARATHI	36	F	BL	YES	YES	NO	NO	NO	YES	NO	NO	NO	NO	NO	30	B	NOR	N	D	5
SELVAM	38	M	BL	YES	YES	NO	NO	NO	YES	NO	NO	NO	NO	NO	32	B	NOR	POL	D	3
PARTHASARTHY	45	M	BL	YES	NO	YES	NO	NO	NO	YES	NO	NO	NO	NO	35	B	NOR	N	D	5
SURESH	42	M	UL	YES	NO	YES	NO	NO	YES	NO	NO	NO	NO	NO	35	B	NOR	N	D	3

SANKAR	29	M	UL	YES	NO	YES	NO	NO	NO	YES	NO	NO	NO	NO	32	B	NOR	N	D	4
UMA MAHESHWARI	52	F	UL	YES	NO	NO	YES	NO	NO	YES	NO	NO	NO	NO	31	B	NOR	N	D	5
LAILA	46	F	BL	YES	NO	NO	YES	NO	YES	NO	NO	NO	NO	NO	28	B	NOR	POL	D	10
YAMINI	35	F	BL	YES	NO	NO	YES	NO	YES	NO	NO	NO	NO	NO	29	B	NOR	POL	D	10
DILIP	29	M	UL	YES	NO	NO	YES	NO	NO	YES	NO	NO	NO	NO	32	B	NOR	N	D	3
ASHOKAN	52	M	BL	YES	NO	NO	YES	NO	NO	YES	NO	NO	NO	NO	34	B	NOR	N	D	4
RAJAN	34	M	BL	YES	NO	NO	YES	NO	NO	YES	NO	NO	NO	NO	28	B	NOR	N	D	5
DIVYA	36	F	BL	YES	NO	NO	NO	YES	YES	NO	NO	NO	NO	NO	51	B	INCUS	POL	D	15
TAMILARASI	32	F	BL	YES	NO	NO	NO	YES	YES	NO	NO	NO	NO	NO	44	B	INCUS	POL	D	15
JEMIMA	31	F	BL	YES	NO	NO	NO	YES	YES	NO	NO	NO	NO	NO	35	B	NOR	N	D	5
FATHIMA	28	F	BL	YES	NO	NO	NO	YES	YES	NO	NO	NO	NO	NO	51	B	INCUS	POL	D	20
DURGA	52	F	UL	YES	NO	NO	NO	YES	YES	NO	NO	NO	NO	NO	48	B	INCUS	POL	D	25
SARASWATHI	34	F	UL	YES	NO	NO	NO	YES	YES	NO	NO	NO	NO	NO	45	B	INCUS	POL	D	15
CHINNAPONNU	37	F	BL	NO	NO	NO	NO	NO	NO	NO	YES	YES	NO	NO	51	AD	INCUS	N	HOH	5
GAUTHAMI	35	F	UL	NO	NO	NO	NO	NO	NO	NO	YES	YES	NO	NO	50	AD	INCUS	N	HOH	5
VIVEK	28	M	BL	NO	NO	NO	NO	NO	NO	NO	YES	YES	NO	NO	28	A	NOR	N	HOH	1
SIVA	45	M	BL	NO	NO	NO	NO	NO	NO	NO	YES	YES	NO	NO	30	A	NOR	N	HOH	2
RAJATHI	35	F	BL	NO	NO	NO	NO	NO	NO	NO	YES	YES	NO	NO	32	A	NOR	N	HOH	1
GOMATHI	50	F	BL	NO	NO	NO	NO	NO	NO	NO	YES	YES	NO	NO	34	A	NOR	N	HOH	0.5
SARANYA	34	F	BL	NO	NO	NO	NO	NO	NO	NO	YES	YES	NO	NO	31	A	NOR	N	HOH	0.5
PARIMALA	32	F	UL	NO	NO	NO	NO	NO	NO	NO	YES	YES	NO	NO	30	A	NOR	N	HOH	1
HEMALATHA	25	F	BL	NO	NO	NO	NO	NO	NO	NO	YES	YES	NO	NO	28	A	NOR	N	HOH	1
RAMYA	31	F	BL	NO	NO	NO	NO	NO	NO	NO	YES	YES	NO	NO	27	A	NOR	N	HOH	1
SORUPPA	28	F	BL	NO	NO	NO	NO	NO	NO	NO	YES	YES	NO	NO	33	A	NOR	N	HOH	0.5
GOPAL	48	M	BL	NO	NO	NO	NO	NO	NO	NO	YES	YES	NO	NO	35	A	NOR	N	HOH	0.5

KEY WORDS TO MASTERCHART

PER ANT - PERFORATION ANTERIOR

PER POST - PERFORATION POSTERIOR

PER CEN - PERFORATION CENTRAL

PER SUB - PERFORATION SUBTOTAL

PER ACT - PERFORATION ACTIVE

PER INACT - PERFORATION INACTIVE

ADOM - ADHESIVE OTITIS MEDIA

PS - POSTEROSUPERIOR

MID EAR - MIDDLE EAR

PTA - PURE TONE AUDIOMETRY

POL - POLYPOIDAL

N - NORMAL

D - DISCHARGE

INFORMATION SHEET

We are conducting a prospective cohort study on **"CORRELATIVE STUDY OF CLINICAL FINDINGS ,AUDIOLOGICAL EVALUATION AND PEROPERATIVE FINDINGS IN PATIENT WITH CONDUCTIVE HEARING LOSS"**

- at the Upgraded Institute of Otorhinolaryngology, Madras Medical College & Rajiv Gandhi Government General Hospital, Chennai – 600003

- Patients with squamous epithelial type of chronic otitis media are enrolled in the study they will b undergoing HRCT and MRI DWI along with other routine blood investigations and will be proceeded with surgery

- At the time of announcing the results and suggestions, name and identity of the patients will be confidential.

- Taking part in this study is voluntary. You are free to decide whether to participate in this study or to withdraw at any time; your decision will not result in any loss of benefits to which you are otherwise entitled.

- The results of the special study may be intimated to you at the end of the study period or during the study if anything is found abnormal which may aid in the management or treatment.

Signature of Investigator **Signature of Participant**

Date :

PATIENT CONSENT FORM

Title of the Project : on CORRELATIVE STUDY OF CLINICAL FINDINGS, AUDIOLOGICAL EVALUATION AND PEROPERATIVE FINDINGS IN PATIENT WITH CONDUCTIVE HEARING LOSS

Institution : Upgraded Institute of Otorhinolaryngology,
Madras Medical College,
Chennai – 600003.

Name :
Date :
Age :
IP No. :
Sex :
Project Patient No. :

The details of the study have been provided to me in writing and explained to me in my own language.

I confirm that I have understood the above study and had the opportunity to ask questions.

I understood that my participation in the study is voluntary and that
I am free to withdraw at any time, without giving any reason, without the medical care that will normally be provided by the hospital being affected.

I agree not to restrict the use of any data or results that arise from this study provided such a use is only for scientific purpose(s).

I have been given an information sheet giving details of the study.

I fully consent to participate in the above study.

_____	_____	_____
Name of the subject	Signature	Date
_____	_____	_____
Name of the Investigator	Signature	Date

<u>ஆராய்ச்சி தகவல்தாள்</u>

சென்னை ராஜீவ் காந்தி அரசு பொது மருத்துவமனைக்கு வரும் காதின் உள் எலும்புகள் வழியே ஒலி கடந்து செல்லும் பாதையில் ஏற்படும் செவித்திறன் குறைபாடு உடைய நோயாளிகளின் நோயின் தன்மை, காது கேட்கும் திறனின் பரிசோதனைகளை, அறுவை சிகிச்சையின்போது உள்ள நோயின் தன்மையுடன் ஒப்பிட்டுப் பார்க்கும் ஆய்வு.

இந்த ஆராய்ச்சியில் பாதிக்கப்பட்ட நோயாளிகளை கண்டறிந்து அதற்கேற்ப அறுவை சிகிச்சை மற்றும் மருந்துகளை அளித்து அந்த சிகிச்சை முறைகளின் தன்மையைப் பற்றி ஆராய்வது.

நீங்கள் இந்த ஆராய்ச்சியில் பங்கேற்க நாங்கள் விரும்புகிறோம்.

இந்த ஆராய்ச்சியின் முடிவுகளை அல்லது கருத்துக்களை வெளியிடும் போதோ அல்லது ஆய்வின் போதோ தங்களது பெயரையோ அல்லது அடையாளங்களையோ வெளியிடமாட்டோம் என்பதையும் தெரிவித்துக்கொள்கிறேம்.

இந்த ஆய்வில் பங்கேற்பது தங்களுடைய விருப்பத்தின் பேரில்தான் இருக்கிறது. மேலும் நீங்கள் எந்நேரமும் இந்த ஆய்விலிருந்து பின்வாங்கலாம் என்பதையும் தெரிவித்துக் கொள்கிறோம்.

இந்த ஆராய்ச்சியின் முடிவுகளை ஆராய்ச்சியின்போது அல்லது ஆய்வின் முடிவின் போது தங்களுக்கு அறிவிப்போம் என்பதையும் தெரிவித்துக் கொள்கிறோம்.

ஆய்வாளரின் கையொப்பம் **பங்கேற்பாளர் கையொப்பம்**

தேதி

<u>சுய ஒப்புதல் படிவம்</u>

ஆய்வு செய்யப்படும் தலைப்பு

காதின் உள் எலும்புகள் வழியே ஒலி கடந்து செல்லும் பாதையில் ஏற்படும் செவித்திறன் குறைபாடு உடைய நோயாளிகளின் நோயின் தன்மை, காது கேட்கும் திறனின் பரிசோதனைகளை, அறுவை சிகிச்சையின்போது உள்ள நோயின் தன்மையுடன் ஒப்பிட்டுப் பார்க்கும் ஆய்வு

ஆய்வாளர் பெயர் : மரு.சா.மதன்குமார்
ஆராய்ச்சி நிலையம் : சென்னை மருத்துவக் கல்லூரி மற்றும்
ராஜீவ் காந்தி அரசு பொது மருத்துவமனை,
சென்னை – 3.

பங்கு பெறுவரின் பெயர் :
பங்குபெறுபவரின் எண் :

பங்குபெறுபவர் இதனை (✓) குறிக்கவும்

மேலே குறிப்பிட்டுள்ள மருத்துவ ஆய்வின் விவரங்கள் எனக்கு விளக்கப்பட்டது. என்னுடைய சந்தேகங்களை கேட்கவும், அதற்கான தகுந்த விளக்கங்களை பெறவும் வாய்ப்பளிக்கப்பட்டது. ☐

நான் இவ்வாய்வில் தன்னிச்சையாகதான் பங்கேற்கிறேன். எந்த காரணத்தினாலோ எந்த கட்டத்திலும் எந்த சட்ட சிக்கலுக்கும் உட்படாமல் நான் இவ்வாய்வில் இருந்து விலகி கொள்ளலாம் என்றும் அறிந்து கொண்டேன். ☐

இந்த ஆய்வு சம்பந்தமாகவோ, இதை சார்ந்த மேலும் ஆய்வு மேற்கொள்ளும் போதும் இந்த ஆய்வில் பங்குபெறும் மருத்துவர் என்னுடைய மருத்துவ அறிக்கைகளை பார்ப்பதற்கு என் அனுமதி தேவையில்லை என அறிந்து கொள்கிறேன். நான் ஆய்வில் இருந்து விலகிக் கொண்டாலும் இது பொருந்தும் என அறிகிறேன். ☐

இந்த ஆய்வின் மூலம் கிடைக்கும் தகவல்களையும், பரிசோதனை முடிவுகளையும் மற்றும் சிகிச்சை தொடர்பான தகவல்களையும் மருத்துவர் மேற்கொள்ளும் ஆய்வில் பயன்படுத்திக்கொள்ளவும் அதை பிரசுரிக்கவும் என் முழு மனதுடன் சம்மதிக்கின்றேன். ☐

இந்த ஆய்வில் பங்கு கொள்ள ஒப்புக்கொள்கிறேன். எனக்கு கொடுக்கப்பட்ட அறிவுரைகளின்படி நடந்து கொள்வதுடன் 'இந்த ஆய்வை மேற்கொள்ளும் மருத்துவ அணிக்கு உண்மையுடன் இருப்பேன் என்று உறுதியளிகிறேன். ☐

இந்த ஆய்வில் எனக்கு இரத்தம், எக்ஸ்ரே, காது,மூக்கு,தொண்டை சிறப்பு பரிசோதனைகள், செவி கேட்புத்திறன் போன்ற பரிசோதனைகள் செய்துகொள்ள சம்மதம். ☐

பங்கேற்பவரின் கையொப்பம் ..... இடம்..... தேதி.....
கட்டைவிரல் ரேகை

பங்கேற்பவரின் பெயர் மற்றும் விலாசம் .....

ஆய்வாளரின் கையொப்பம் ..... இடம்..... தேதி.....
ஆய்வாளரின் பெயர் .....

INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE, CHENNAI 600 003

EC Reg.No.ECR/270/Inst./TN/2013
Telephone No.044 25305301
Fax: 011 25363970

CERTIFICATE OF APPROVAL

To
Dr.Madhan Kumar.S.
Post Graduate in M.S.(E,N.T.)
Madras Medical College
Chennai 600 003

Dear Dr.Madhan Kumar.S.,

The Institutional Ethics Committee has considered your request and approved your study titled **"CORRELATIVE STUDY OF CLINICAL FINDINGS AUDIOLOGICAL EVALUATION AND PEROPERATIVE FINDINGS IN PATIENT WITH CONDUCTIVE HEARING LOSS " - NO.32032016.**

The following members of Ethics Committee were present in the meeting hold on **01.03.2016** conducted at Madras Medical College, Chennai 3

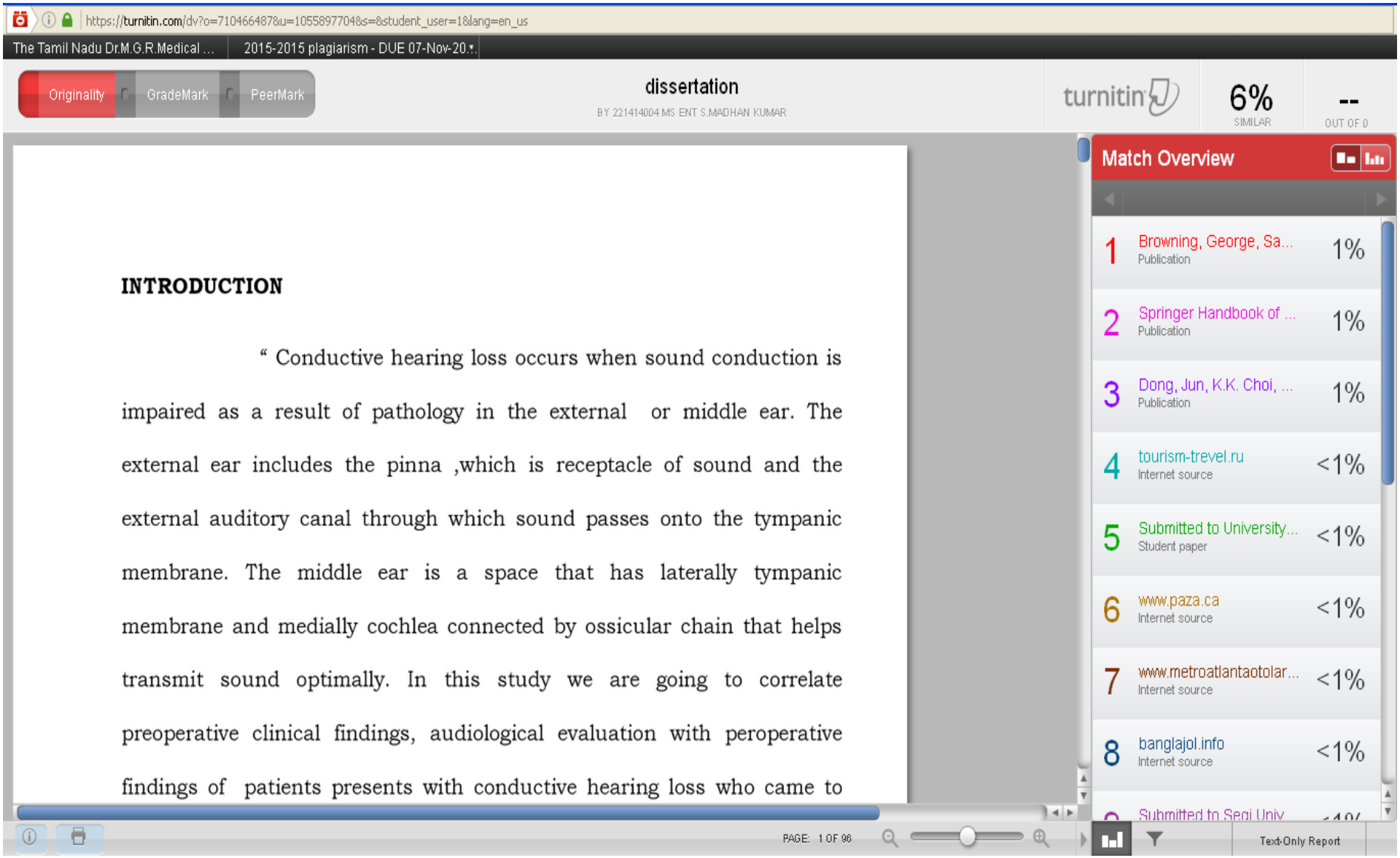
1.Dr.C.Rajendran, MD.,	:Chairperson
2.Dr.R.Vimala,MD.,Dean,MMC,Ch-3	:Deputy Chairperson
3.Prof.Sudha Seshayyan,MD., Vice Principal,MMC,Ch-3	: Member Secretary
4.Prof.B.Vasanthi,MD.,Inst.of Pharmacology,MMC,Ch-3	: Member
5.Prof.P.Raghumani,MS, Dept.of Surgery,RGGGH,Ch-3	: Member
6.Dr.Baby Vasumathi, Director, Inst. of O&G,Ch-8	: Member
7.Prof.M.Saraswathi,MD.,Director, Inst.of Path,MMC,Ch-3	: Member
8.Prof.Srinivasagalu,Director,Inst.of Int.Med.,MMC,Ch-3	: Member
9.Tmt.J.Rajalakshmi, JAO,MMC, Ch-3	: Lay Person
10.Thiru S.Govindasamy, BA.,BL,High Court,Chennai	: Lawyer
11.Tmt.Arnold Saulina, MA.,MSW.,	:Social Scientist

We approve the proposal to be conducted in its presented form.

The Institutional Ethics Committee expects to be informed about the progress of the study and SAE occurring in the course of the study, any changes in the protocol and patients information/informed consent and asks to be provided a copy of the final report.

Member Secretary - Ethics Committee

MEMBER SECRETARY
INSTITUTIONAL ETHICS COMMITTEE.
MADRAS MEDICAL COLLEGE
CHENNAI-600 003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INTRODUCTION
" Conductive hearing loss occurs when sound conduction is impaired as a result of pathology in the external or middle ear. The external ear includes the pinna ,which is receptacle of sound and the external auditory canal through which sound passes onto the tympanic membrane. The middle ear is a space that has laterally tympanic membrane and medially cochlea connected by ossicular chain that helps transmit sound optimally. In this study we are going to correlate preoperative clinical findings, audiological evaluation with peroperative findings of patients presents with conductive hearing loss who came to
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